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A

# KEY

TO THE

# INTRODUCTION

TO THE

# NATIONAL ARITHMETIC,

EXHIBITING THE OPERATION OF

THE MORE DIFFICULT EXAMPLES

IN THAT WORK;

FOR THE USE OF TEACHERS ONLY.

BY BENJAMIN GREENLEAF, A.M.
PRINCIPAL OF BRADFORD TEACHERS' SEMINARY.

NEW STEREOTYPE EDITION.

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# PREFACE.

THE object of the author, in this publication, is to aid the teacher in communicating instruction to his pupils, and in detecting any error which they may have made in the operation of the examples.

Every instructor, who has a large number of scholars under his care, is aware that it is a great tax on his time, especially when in school, to examine the operation of many arithmetical questions; whereas, by the aid of a Key, he may readily detect any mistake in the operation. Besides, amid the labors of the school-room, it is often very difficult for the most able arithmetician to recollect, at the moment, all the principles involved in the solution of difficult questions; but, by recurring to a Key, this difficulty will be obviated.

The author would recommend to teachers never to point out *directly* to the pupil the method of solving a problem, nor perform the labor for him, but suggest and explain such principles as will enable him to perform the question himself.

The answers to all the examples in the Arithmetic are inserted in the Key, for the convenience of those teachers who may prefer to use the edition of the Arithmetic which does not contain the answers.

B. GREENLEAF.

*Bradford, Mass., Feb.* 16, 1857.

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# KEY

TO

# GREENLEAF'S INTRODUCTION.

---

## NOTATION AND NUMERATION.

### Roman Notation.

| | | | |
|---|---|---|---|
| 2. (Art. 3, p. 9.) | LXXXVII. | 6. | DXLII. |
| 3. | CX. | 7. | MCCCXIX. |
| 4. | CLXIX. | 8. | MDCCCLVIII. |
| 5. | CCLXXV. | | |

### French Notation and Numeration.

| | | | |
|---|---|---|---|
| 1. (Art. 13, p. 13.) | 47 | 10. | 408,096 |
| 2. | 359 | 11. | 5,402 |
| 3. | 6,575 | 12. | 907,805,074 |
| 4. | 908 | 13. | 347,915 |
| 5. | 19,000 | 14. | 89,047 |
| 6. | 1,504 | 15. | 51,081 |
| 7. | 27,000,500 | 16. | 7,395 |
| 8. | 99,099 | 17. | 57,059,099,047 |
| 9. | 42,002,005 | | |

### English Notation and Numeration.

| | |
|---|---|
| 1. (Art. 16, p. 15.) | 325,412 |
| 2. | 214,165; 078,056 |
| 3. | 42; 617,031; 041,342 |
| 4. | 2,008; 009,082; 701,908 |

## ADDITION.

| | | | |
|---|---|---|---|
| 3. (**Art. 20**, p. **19.**) | 978 | 7. | 698 |
| 4. | 889 | 8. | 999 |
| 5. | 998 | 9. | 439 |
| 6. | 669 | 10. | 868 |

| | | | |
|---|---|---|---|
| 10. (**Art. 23**, p. **21.**) | 3555 | 35. | 694764 |
| 11. | 3212 | 36. | 156800 |
| 12. | 1922 | 37. | 1802790 |
| 13. | 3175 | 38. | 76833457 |
| 14. | 27891 | 39. | 1111110 |
| 15. | 289436 | 40. | 9323 |
| 16. | 354409 | 41. | 7693486 |
| 17. | 347514 | 42. | 3155917 |
| 18. | 882898 | 43. | 2643 |
| 19. | 26027511 | 44. | 1039 |
| 20. | 1366855 | 45. | 227934 |
| 21. | 6908906 | 46. | 63315 |
| 22. | 142885 | 47. | 2373544 |
| 23. | 21616 | 48. | 8272 dollars. |
| 24. | 766503 | 49. | 131 trees. |
| 25. | 13814 | 50. | 1563 pounds. |
| 26. | 969754 | 51. | 2103 dollars. |
| 27. | 11720 | 52. | 2257 dollars. |
| 28. | 31622 | 53. | 500 dollars. |
| 29. | 949661 | 54. | 9115 dollars. |
| 30. | 86578 | 55. | 2728116 |
| 31. | 539658 | 56. | 6624988 |
| 32. | 57372 | 57. | 3952837 |
| 33. | 848340 | 58. | 3321317 |
| 34. | 1000779 | 59. | 6564818 |

| | | | |
|---|---|---|---|
| 2. (**Art. 24**, p. **24.**) | 95947 | 5. | 113378 |
| 3. | 102201 | 6. | 86621 |
| 4. | 100536 | | |

## SUBTRACTION.

| | | | |
|---|---|---|---|
| 8. | **(Art. 32, p. 30.)** 47896 | 25. | 799690466 |
| 9. | 265899 | 26. | 24974975 |
| 10. | 587544 | 27. | 89901 |
| 11. | 377778 | 28. | 90909091 |
| 12. | 9393239896470 | 29. | 999991 |
| 13. | 1 | 30. | 2967 |
| 14. | 471112 | 31. | 99995000 |
| 15. | 981012 | 32. | 767 dollars. |
| 16. | 1 | 33. | 39 years. |
| 17. | 9998392 | 34. | 105 years. |
| 18. | 6097700810072 | 35 | 4731 |
| 19. | 7977100909213 | 36. | 6122423 inhabitants. |
| 20. | 7100061569937 | 37. | 16817082 bushels. |
| 21. | 500710920089 | 38. | 2246193 bushels. |
| 22. | 1 | 39. | 6181001 dollars. |
| 23. | 455555556 | 40. | 577904 |
| 24. | 8753086431 | 41. | 49841021 miles. |

| | | | |
|---|---|---|---|
| 2. | **(Art. 33, p. 32.)** 2588 acres. | 3. | 3528 dollars. |

## MULTIPLICATION.

| | | | |
|---|---|---|---|
| 9. | **(Art. 36, p. 36.)** 6910677 | 14. | 50246229 |
| 10. | 7012310120 | 15. | 60725 dollars. |
| 11. | 53580296 | 16. | 228456 dollars. |
| 12. | 24881935 | 17. | 27918 letters. |
| 13. | 105185376 | | |

| | | | |
|---|---|---|---|
| | **(Art. 40, p. 39.)** | 12. | 10989 dollars. |
| 8. | 611 dollars. | 13. | 13505 miles. |
| 9. | 2813 dollars. | 14. | 8760 hours. |
| 10. | 35599 dollars. | 15. | 5481 gallons. |
| 11. | 1853654 dollars. | 16. | 200451 dollars. |

| | | | |
|---|---|---|---|
| 17. | 68816 pounds. | 26. | 532088 |
| 18. | 321300 | 27. | 3831635 |
| 19. | 518077 | 28. | 1462126 |
| 20. | 881919 | 29. | 264640056 |
| 21. | 9691836 | 30. | 99070437 |
| 22. | 18219071 | 31. | 826888542 |
| 23. | 70287492 | 32. | 290355807 |
| 24. | 153288487686 | 33. | 721361144 |
| 25. | 49062139937803 | 34. | 3798979491 |

| | | | |
|---|---|---|---|
| 2. | (Art. 42, p. 41.) 765325 | 6. | 2851200 inches. |
| 3. | 123396 | 7. | 631152 hours. |
| 4. | 611226 | 8. | 68520 feet. |
| 5. | 987625 | | |

| | | | |
|---|---|---|---|
| 2. | (Art. 43, p. 42.) 23560 | 4. | 7964000 |
| 3. | 587300 | 5. | 9872500000 |

| | | | |
|---|---|---|---|
| | (Art. 44, p. 43.) | 10. | 910089999000 |
| 4. | 72103581726300 | 11. | 24010024010000 |
| 5. | 490154012100000000 | 12. | 400400800400400 |
| 6. | 28522743249000 | 13. | 1224241200000 |
| 7. | 4179911100000 | 14. | 14122412100 |
| 8. | 11717175236000 | 15. | 18000220000 |
| 9. | 69660900000000 | 16. | 1100022000000 |

## DIVISION.

| | Quotients. | Rem. | | Quotients. | Rem |
|---|---|---|---|---|---|
| 5. (Art. 50, p. 48.) | 757913 | 0 | 15. | 186529 | 6 |
| 6. | 1460898 | 1 | 16. | 958131 | 11 |
| 7. | 141090 | 5 | 17. | 1135791 | 1 |
| 8. | 47316 | 4 | 18. | 162255 | 6 |
| 9. | 994864 | 8 | 19. | 202818 | 6 |
| 10. | 698082 | 1 | 20. | 225353 | 3 |
| 11. | 528776 | 9 | 21. | 187794 | 2 |
| 12. | 79992 | 4 | 22. | 170721 | 9 |
| 13. | 55096 | 6 | 23. | 78715 dollars. | |
| 14. | 54848 | 5 | 24 | 17167 acres. | |

| | | | |
|---|---|---|---|
| 25 | 876451 dollars. | 29. | 109517 acres. |
| 26. | 14888 dollars. | 30. | 371 dollars. |
| 27. | 9589 bushels. | 31. | 1315 |
| 28. | 99483 yards. | | |

| | Quotients. | Rem. | | Quotients. | Rem. |
|---|---|---|---|---|---|
| 2. (Art. 51, p. 50.) | 216 | 0 | 4. | 13717421 | 0 |
| 3. | 89786 | 10 | 5. | 32534467 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| 10. (Art. 54. p. 52.) | 234 | | 27. | 5502 | 95 |
| 11. | 365 | | 28. | 9755 | 4060 |
| 12. | 145 | 6 | 29. | 3453 | 7122 |
| 13. | 7634 | 0 | 30. | 30003 | 0 |
| 14. | 5204 | 11 | 31. | 26750 | 962 |
| 15. | 290720 | 25 | 32. | 86268755 | 480 |
| 16. | 68549 | 88 | 33. | 8428688 | 22346 |
| 17. | 240415 | 5 | 34. | 62927 | 2295060 |
| 18. | 15608 | 5 | 35. | 1099 | 200210510 |
| 19. | 129725 | 66 | 36. | 476 dollars. | |
| 20. | 144927 | 36 | 37. | 395 acres. | |
| 21. | 14703 | 55 | 38. | 763 dollars. | |
| 22. | 1919 | 55 | 39. | 345 bushels each | |
| 23. | 912 | 30 | 40. | 389 dollars. | |
| 24. | 3502319 | 714 | 41. | 1234 men. | |
| 25. | 26080418 | 234 | 42. | $6538\frac{1279}{4597}$ dollars. | |
| 26. | 11058232 | 277 | | | |

| | | | |
|---|---|---|---|
| 2 (Art. 55, p. 54.) | 30613 | 5. | 7901 |
| 3. | 1469 | 6. | 182 |
| 4. | 7546 | 7. | 264 |

| | | | |
|---|---|---|---|
| 3. (Art. 56, p. 55.) | 54 | 5. | 77 |
| 4. | 20 | 6. | 405 |

| | Quotients. | Rem. | | Quotients. | Rem. |
|---|---|---|---|---|---|
| 2. (Art. 57, p. 56.) | 689 | 2 | 4. | 24 | 815 |
| 3. | 43 | 75 | 5. | 9876 | 54321123 |

**(Art. 59, p. 57.)**

|  | Quotients. | Rem. |
|---|---|---|
| 2. | 44 | 74 |
| 3. | 332 | 192 |
| 4. | 667 | 253 |
| 5. | 1473 | 2597 |
| 6. | 102 | 497654325 |
| 7. | 3491706185 | 306787 |
| 8. | 948266 | 411328000 |
| 9. | 20729 | 5115000 |
| 10. | 18191 | 618562300 |
| 11. | 85 | 44916000000 |

---

## CONTRACTIONS IN MULTIPLICATION.

**(Art. 61, p. 62.)**
2. 1914741450
3. 14197467925
4. 3086419725

**(Art. 62, p. 62.)**
2. 11892984700
3. 29037739400
4. 19454930400

**(Art. 63, p. 62.)**
2. 995665625
3. 154320875
4. 381232750

**(Art. 64, p. 63.)**
2. 1233332433
3. 876542123457
4. 999998000001

---

## CONTRACTIONS IN DIVISION.

2. **(Art. 65, p. 63.)** 395061
3. 55157
4. $85999\frac{96}{100}$

**(Art. 66, p. 64.)**
2. $29629629\frac{63}{100}$
3. $261371\frac{34}{100}$
4. $143686\frac{8}{100}$
5. $2690\frac{28}{100}$
6. $535\frac{62}{100}$

2. **(Art. 67, p. 64.)** 13825
3. 3830106
4. 4729879
5. $3917\frac{184}{1000}$
6. $6689\frac{472}{1000}$

---

## MISCELLANEOUS EXAMPLES.

1. **(p. 65.)** 584 dollars.
2. 25088 dollars.
3. 940 cents.
4. 1530 cents.
5. 873 dollars.
6. 4257 cents.

| | | | |
|---|---|---|---|
| 7. | 2106 miles. | 27. | 25 |
| 8. | 61 miles. | 28. | 135442 |
| 9. | 35405 dollars. | 29. | 144 feet. |
| 10. | 42884 dollars. | 30. | 123040 rods. |
| 11. | 7665 dollars. | 31. | 630 dollars. |
| 12. | 37 dollars. | 32. | 187 dollars. |
| 13. | 47 dollars. | 33. | 1188 dollars. |
| 14. | 1368 hours. | 34. | 413 dollars. |
| 15. | 5904 ounces. | 35. | 5430 dollars. |
| 16. | 56960 acres. | 36. | 457 dollars. |
| 17. | 234 dollars. | 37. | Loss, 3 dollars. |
| 18. | 3178 dollars. | 38. | Gain, 22 dollars. |
| 19. | 7581 dollars. | 39. | The land, by 5136 dollars. |
| 20 | Gain, 1488 cents. | 40. | 543 dollars. |
| 21. | 576 dollars. | 41. | 635 dollars. |
| 22. | 20 dollars. | 42. | 743 dollars. |
| 23. | 255 dollars. | 43. | 1828 dollars. |
| 24. | 3520 | 44. | 133 dollars. |
| 25. | 1607 | 45. | 27 dollars. |
| 26. | 5676 | 46. | 533 dollars. |

## UNITED STATES MONEY.

| | | | |
|---|---|---|---|
| | (Art. 71, p. 71.) | 5. | $41.23 |
| 1. | 12500 cents. | 6. | 15629 cents. |
| 2. | 345000 mills. | 7. | 16428 mills. |
| 3. | $0.297 | 8. | 9870 mills. |
| 4. | $2.682 | | |

### ADDITION.

| | | | |
|---|---|---|---|
| | (Art. 72, p. 72.) | 10. | $13.87 0 |
| | | 11. | $31.64 0 |
| 5. | $4408.88 8 | 12. | $21.62 0 |
| 6. | $410.46 9 | 13. | $3.42 5 |
| 7. | $448.36 8 | 14. | $15.00 0 |
| 8. | $4713.78 6 | 15. | $48.32 0 |
| 9. | $31.61 0 | 16. | $48.46 0 |

### SUBTRACTION.

| | | | |
|---|---|---|---|
| 5. | (ART. 73, p. 73.) $ 52.66 4 | 10. | $ 82.83 0 |
| 6. | $ 71.97 6 | 11. | $ 26.58 0 |
| 7. | $ 724.89 8 | 12. | $ 9.99 1 |
| 8. | $ 782.20 6 | 13. | $ 14.74 0 |
| 9. | $ 65.98 0 | 14. | $ 34.67 1 |

### MULTIPLICATION.

| | | | |
|---|---|---|---|
| 3. | (ART. 74, p. 74.) $ 44.55 0 | 9. | $ 672.01 |
| 4. | $ 414.64 0 | 10. | $ 106.97 |
| 5. | $ 7.31 0 | 11. | $ 450.00 |
| 6. | $ 30.87 5 | 12. | $ 1600.50 |
| 7. | $ 1774.25 0 | 13. | $ 24327.96 |
| 8. | $ 85.50 | | |

### DIVISION.

| | | | |
|---|---|---|---|
| 3. | (ART. 75, p. 75.) $ 137.37 | 9. | $ 0.93 |
| 4. | $ 5.63 | 10. | $ 3.28 |
| 5. | $ 20.00 | 11. | $ 11.67 |
| 6. | $ 0.59 | 12. | $ 4.68 |
| 7. | $ 5.68 | 13. | $ 132.55 |
| 8. | $ 0.13 | 14. | $ 5.75 |

### PRACTICAL QUESTIONS BY ANALYSIS.

| | | | |
|---|---|---|---|
| 2. | (ART. 77, p. 76.) $ 90.21 | 6. | $ 68.40 |
| 3. | $ 29.70 | 7. | $ 5525.28 |
| 4. | $ 42.21 | 8. | $ 737.64 |
| 5. | $ 728.19 | | |

10. (ART. 78, p. 77.) $ 422.50 ÷ 65 = $ 6.50; $ 350 × 15 = $ 97.50 Ans.
11. $ 2025 ÷ 45 = $ 45 ; $ 45 × 180 = $ 8100 Ans.
12. $ 3.45 ÷ 5 = $ 0.69 ; $ 0.69 × 11 = $ 7.59 Ans.
13. $ 214.50 ÷ 11 = $ 19.50; $ 19.50 × 87 = $ 1696.50 Ans
14. $ 60.00 ÷ 8 = $ 7.50 ; $ 7.50 × 87 = $ 652.50 Ans.
15. $ 5.58 ÷ 9 = $ 0.62 ; $ 0.62 × 43 = $ 26.66 Ans.
16. $ 85 ÷ 5 = $ 17 ; $ 17 × 97 = $ 1649 Ans.

17. $ 3.80 ÷ 20 = $ 0.19; $ 0.19 × 59 = $ 11.21 Ans.
18. $ 472.50 ÷ 27 = $ 17.50; $ 17.50 × 12 = $ 210 Ans.
19. $ 39.69 ÷ 7 = $ 5.67; $ 5.67 × 57 = $ 323.19 Ans.
20. $ 10.08 ÷ 144 = $ 0.07; $ 0.07 × 359 = $ 25.13 Ans.
21. $ 77.13 ÷ 857 = $ 0.09; $ 0.09 × 359 = $ 32.31 Ans.
22. $ 187.53 ÷ 987 = $ 0.19; $ 0.19 × 329 = $ 62.51 Ans.
23. $ 26.32 ÷ 47 = $ 0.56; $ 0.56 × 39 = $ 21.84 Ans.

25. (Art. **79**, p. **78.**) 175 ÷ 5 = 35 reams, Ans.
26. 217.50 ÷ 7.50 = 29 barrels, Ans.
27. 4875 ÷ 75 = 65 tons, Ans.
28. 1728 ÷ 4 = 432 yards, Ans.
29. 9.66 ÷ 0.69 = 14 hundred weight, Ans.
30. 66.51 ÷ 7.39 = 9 barrels, Ans.
31. 136.50 ÷ 3.25 = 42 cords, Ans.

## Bills.

(Art. **80**, p. **79.**)

(1.) J. Smith.

$ 0.75 × 82 = $ 61.50
0.92 × 89 = 81.88
0.50 × 24 = 12.00
$ 155.38

(2.) L. Webster.

$ 0.18 × 6 = $ 1.08
0.20 × 12 = 2.40
1.80 × 6 = 10.80
0.26 × 30 = 7.80
$ 22.08

(3.) W. Greenleaf.

$ 0.50 × 86 = $ 43.00
0.86 × 90 = 77.40
11.00 × 18 = 198.00
3.50 × 23 = 80.50
0.62 × 14 = 8.68
12.12 × 12 = 145.44
12.00 × 46 = 552.00
$ 1105.02

(4.) A. Dow.

$ 23.75 × 37 = $ 878.75
17.50 × 42 = 735.00
99.00 × 43 = 4257.00
175.00 × 12 = 2100.00
7.00 × 19 = 133.00
1.52 × 23 = 34.96
$ 8138.71

(5.) Dr. John Wade To Ayer, Fitts, & Co. Cr.

| Dr. | | Cr. | |
|---|---|---|---|
| $ 1.20 × 80 = | $ 96.00 | $ 0.20 × 27 = | $ 5.40 |
| 3.00 × 17 = | 51.00 | 3.90 × 10 = | 39.00 |
| 1.08 × 19 = | 20.52 | 4.75 × 7 = | 33.25 |
| 0.75 × 23 = | 17.25 | 2.93 × 19 = | 55.67 |
| | | 0.37 × 20 = | 7.40 |
| | $ 184.77 | | $ 140.72 |

$ 184.77
140.72

Balance due, $ 44.05

(Art. 81, p. 81.)

1. $ 254.27
2. $ 338.36
3. $ 1995.52
4. $ 19411.14

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## REDUCTION.

(Art. 86, p. 84.)

(3.)

9£. 18s. 7d.
20
198s.
12
2383d. Ans.

(4.)

12)2383d.
20)198s. 7d.
Ans. 9£. 18s. 7d.

(5.)

14£. 11s. 5d. 2far.
20
291s.
12
3497d.
4
13990far. Ans.

(6.)

4)13990far.
12)3497d. 2far.
20)291s. 5d.
Ans. 14£. 11s. 5d. 2far.

(Art. 87, p. 86.)

(3.)
76pwt. 12gr.
24
306
153
Ans. 1836gr.

(4.)
24)1836gr.
Ans. 76pwt. 12gr.

(5.)
76lb. 5oz.
12
917oz.
20
18340pwt.
24
Ans. 440160gr.

(6.)
24)440160gr.
20)18340pwt.
12)917oz.
Ans. 76lb. 5oz.

(7.)
144lb. 9oz.
12
1737oz.
20
Ans. 34740pwt.

(8.)
20)34740pwt.
12)1737oz.
Ans. 144lb. 9oz.

(9.)
24)17895gr.
20)745pwt. 15gr.
12)37oz. 5pwt.
Ans. 3lb. 1oz.
[5pwt. 15gr.

(10.)
3lb. 1oz. 5pwt. 15gr.
12
37oz.
20
745pwt.
24
Ans. 17895gr.

(11.)
2oz. 18pwt. 12gr.
20
58pwt.
24
1404gr.
1.37
Ans. $ 1923.48

(Art. 88, p. 87.)

(3.)
76℔
12
912℥
8
7296ʒ
3
21888℈ Ans.

(4.)
3)21888℈
8)7296ʒ
12)912℥
Ans. 76℔

(5.)
144℔
12
1728℥
8
13824ʒ
3
41472℈
20
Ans. 829440gr.

(6.)
20)829440gr.
3)41472℈
8)13824ʒ
12)1728℥
Ans. 144℔

(7.)
12℔ 8℥ 3ʒ 1℈ 18gr.
12
152℥
8
1219ʒ
3
3658℈
20
73178gr. Ans.

(8.)
20)73178gr.
3)3658℈ 18gr.
8)1219ʒ 1℈
12)152℥ 3ʒ
Ans. 12℔ 8℥
[3ʒ 1℈ 18gr.

(9.)
7℥ 6ʒ 2℈
8
62ʒ
3
Ans. 188 doses.

### (Art. 89, p. 89.)

(3.) 16T. 19cwt 0qr. 10lb. 11oz. 5dr.
20
339
4
1356
25
6780
2713
33910
16
203461
33911
542571
16
3255431
542571
8681141

(4.) 16)8681141dr.
16)542571oz. 5dr.
25)33910lb. 11oz.
4)1356qr. 10lb.
20)339cwt. 0qr.
16T. 19cwt. 0qr. 10lb. 11oz. 5dr.

(5.) 679cwt.
4
2716qr.
25
13580
5432
67900lb. Ans.

(6.) 25)67900lb.
4)2716qr.
679cwt. Ans.

(7.)

17cwt. 0qr. 18lb
4
71qr.
25
363
143
1793lb.
.07
$125.51 Ans.

(8.)

48T. 17cwt.
20
977cwt.
4
3908qr.
25
19540
7816
97700lb.
.08
$7816.00 Ans.

(Art. 90, p. 90.)

(3.)

144yd. 3qr.
4
Ans. 579qr.

(4.)

4)579qr.
Ans. 144yd. 3qr.

(5.)

17 E. E. 4qr. 3na.
5
89qr.
4
Ans. 359na.

(6.)

4)359na.
5)89qr. 3na.
Ans. 17 E. E. 4qr. 3na.

(7.)

126yd. 0qr. 3na.
4
504qr.
4
Ans. 2019na.

(8.)

4)2019na.
4)504qr. 3na.
Ans. 126yd. 0qr. 3na.

2*

(9.)
49yd. 3qr.
4
199qr.
2.17
Ans. $ 431.83

(10.)
144yd. 1qr. 3na.
4
577qr.
4
2311na.
.25
Ans. $ 577.75

**(Art. 91, p. 92.)**

(3.)
47m.
8
376fur.
40
15040rd.
16½
Ans. 248160ft.

(4.)
16½)248160ft.
40)15040rd.
8)376fur.
Ans. 47m.

(5.) 78deg. 50m. 7fu. 30rd. 5yd. 2ft. 10in.
69⅙
752
468
13
5445
8
43567
40
1742710
5½
8713555
871355
9584910
3
28754732
12
345056794

(6.)
12)345056794in.
3)28754732ft. 10in.
5½)9584910yd. 2ft.
40)1742710rd. 5yd.
8)43567fur. 30rd.
69⅙)5445m. 7fur.
78deg. 50m. 7fur. 30rd. 5yd.
[2ft. 10in.

(ART. 92, p. 93.)

(3.)
80)4386cha.
Ans. 54m. 66cha.

(4.)
54m. 66cha.
80
Ans. 4386cha.

(5.)
75m. 49cha.
80
6049cha.
4
Ans. 24196 poles.

(6.)
4)24196 poles.
80)6049cha.
Ans. 75m. 49cha.

(7.)
7m. 4fur. 30rd.
8
60fur.
40
2430rd.
25
Ans. 60750l.

(8.)
25)60750l.
40)2430rd.
8)60fur. 30rd.
Ans. 7m. 4fur. 30rd.

(ART. 93, p. 96.)

(3.)
49A. 3R. 16p.
4
199R.
40
7976p.
272¼
Ans. 2171466ft.

(4.)
272¼)2171466ft.
40)7976p.
4)199R. 16p.
Ans. 49A. 3R. 16p.

(5.)
365A. 3R. 17p.
4
1463R.
40
58537p.
1.75
Ans. $ 102,439.75

(6.)
3A. 1R. 30p.
4
13R.
40
550p.
272¼
149737½ft.
1.25
Ans. $ 187171.875

(7.)
12m.
12
144 sq. m.
640
Ans. 92160A.

(8.)
18A. 0R. 16p.
4
72R.
40
2896p.
272¼
Ans. 788436 sq. ft.

(9.)
48A. 3R. 14p.
4
195R.
40
7814p.
.90
Ans. $ 7032.60

$ 3.15
2.25
.90

### (Art. 94, p. 98.)

(3.)
45C.
128
5760ft.
1728
9953280 cu. in., Ans.

(4.)
1728)9953280 cu. in.
128)5760ft.
Ans. 45C.

(5.)
15ft.
4
60
6½
128)390 cu. ft.
Ans. 3C. 6ft.

(6.)
4ft.
3¼
13
2
26 cu. ft.
1728
Ans. 44928 cu. in.

(7.)
14
12
168
8
Ans. 1344 cu. ft.

(8.)
40)9080ft.
227
11.50
$ 2610.50

### (Art. 95, p. 99.)

(3.)
197 tuns 3hhd. 60gal. 3qt. 1pt.
4
791hhd.
63
49893gal.
4
199575qt.
2
399151pt.
4
Ans. 1596604gi.

(4.)
4)1596604gi.
2)399151pt.
4)199575qt. 1pt.
63)49893gal. 3qt.
4)791hhd. 60gal.
Ans. 197 tuns 3hhd. 60gal.
[3qt. 1pt.

(5.)
7
63
441gal.
4
1764qt.
2
3528pt.
.05
Ans. $ 176.40

(6.)
18 tuns 1hhd. 47gal.
4
73hhd.
63
4646gal.
1.25
Ans. $ 5807.50

### (Art. 96, p. 100.)

(3.)
4 tuns 1hhd. 17gal. 0qt. 1pt.
4
17hhd.
54
935gal.
4
3740qt.
2
7481pt. Ans.

(4.)
2)7481pt.
4)3740qt. 1pt.
54)935gal.
4)17hhd. 17gal.
Ans. 4 tuns 1hhd. 17gal. 0qt. 1pt.

(5.)
7hhd. 18gal.
54
396gal.
4
1584qt.
.04
$63.36 Ans.

(6.)
18
54
972gal.
.15
Ans. $145.80

### (Art. 97, p. 101.)

(3.)
97ch. 30bu. 2pk.
36
3522bu.
4
14090pk.
8
112720qt. Ans.

(4.)
8)112720qt.
4)14090pk.
36)3522bu. 2pk.
Ans. 97ch. 30bu
[2pk.

(5.)
35bu. 0pk. 0qt. 1pt.
4
140pk.
8
1120qt.
2
2241pt. Ans.

(6.)
2)2241pt.
8)1120qt. 1pt.
4)140pk.
Ans. 35bu. 0pk. 0qt. 1pt.

(7.)
18qr. 0bu. 3pk. 5qt.
8
144bu.
4
579pk.
8
Ans. 4637qt.

(8.)
8)4637qt.
4)579pk. 5 qt.
8)144bu. 3pk.
Ans. 18qr. 0bu. 3pk.
[5qt.

(9.)
19bu. 3pk. 7qt. 1pt.
4
79pk.
8
639qt.
2
Ans. 1279pt.

(10.)
2)1279pt.
8)639qt. 1pt.
4)79pk. 7qt.
Ans. 19bu. 3pk. 7qt. 1pt.

### (Art. 98, p. 104.)

(3.)
296da. 18h. 32m.
24
7122h.
60
Ans. 427352m.

(4.)
60)427352m.
24)7122h. 32m.
Ans. 296da. 18h. 32m.

(5.)

365da. 5h. 48m. 49sec.
24
8765h.
60
525948m.
60
31556929sec.
30
946707870
22699722
Ans. 969407592sec.

262da. 17h. 28m. 42sec.
24
6305h.
60
378328m.
60
22699722sec.

(6.)

365da. 5h. 48m. 49sec.
24
8765h.
60
525948m.
60
31556929 seconds in a solar year.

31556929)969407832(30 years.
946707870
60)22699722sec.
60)378328m. 42sec.
24)6305h. 28m.
262da. 17h.
Ans. 30y. 262da. 17h. 28m. 42sec.

(7.)

60)684592m.
24)11409h. 52m.
7)475d. 9h.
Ans. 67w. 6d. 9h. 52m.

(8.)

67w. 6d. 9h. 52m.
7
475da.
24
11409h.
60
Ans. 684592m.

| | | | |
|---|---|---|---|
| 9. | 189 days. | 12. | 275 days. |
| 10. | 425 days. | 13. | 366 days. |
| 11. | 43 days. | 14. | 1213 days. |

(Art. **99**, p. **106**.)

(3.)

27S. 19° 51′ 28″
30
829°
60
49791′
60
Ans. 2987488″

(4.)

60)2987488″
60)49791′ 28″
30)829° 51′
Ans. 27S. 19° 51′ 28″

### Miscellaneous Exercises.

1. (p. **107**.) 345 × 100 = 34500; 34500 + 18 = 34518; 34518 × 10 = 345180 mills, Ans.
2. 345180 mills ÷ 10 = 34518; 34518 ÷ 100 = $ 345.18, Ans.
3. 46 × 20 = 920s.; 920s. + 18s. = 938s.; 938 × 12 = 11256d.; 11256d. + 5d. = 11261d.; 11261 × 4 = 45044far. Ans.
4. 45044 ÷ 4 = 11261d.; 11261 ÷ 12 = 938s. 5d.; 938 ÷ 20 = 46£. 18s.; 46£. 18s. 5d. Ans.
5. 61 × 12 = 732oz.; 732 × 20 = 14640pwt.; 14640pwt. + 17pwt. = 14657pwt.; 14657 × 24 = 351768gr.; 351768gr. + 17gr. = 351785gr. Ans.
6. 351785gr. ÷ 24 = 14657pwt. 17gr.; 14657 ÷ 20 = 732oz. 17pwt.; 732 ÷ 12 = 61lb.; 61lb. 0oz. 17pwt. 17gr. Ans.
7. 27 × 12 = 324℥; 324℥ + 3℥ = 327℥; 327 × 8 = 2616ʒ; 2616ʒ + 1ʒ = 2617ʒ; 2617 × 3 = 7851℈; 7851℈ + 1℈ = 7852℈ Ans.
8. 7852 ÷ 3 = 2617ʒ 1℈; 2617 ÷ 8 = 327℥ 1ʒ; 327 ÷ 12 = 27℔ 3℥; 27℔ 3℥ 1ʒ 1℈ Ans.
9. 83 × 20 = 1660cwt.; 1660cwt. + 11cwt. = 1671cwt.; 1671 × 4 = 6684qr.; 6684qr. + 3qr. = 6687qr.; 6687 × 25 = 167175lb.; 167175lb. + 18lb. = 167193lb.; 167193 × 16 = 2675088oz. Ans.

10. 2675088 ÷ 16 = 167193lb.; 167193 ÷ 25 = 6687qr. 18lb.; 6687 ÷ 4 = 1671cwt. 3qr.; 1671 ÷ 20 = 83T. 11cwt.; 83T. 11cwt. 3qr. 18lb. Ans.

11. 97 × 4 = 388qr.; 388qr. + 3qr. = 391qr.; 391 × 4 = 1564na.; 1564na. + 3na. = 1567na. Ans.

12. 1567 ÷ 4 = 391qr. 3na.; 391 ÷ 4 = 97yd. 3qr.; 97yd. 3qr. 3na. Ans.

13. 57 × 5 = 285qr.; 285 ÷ 4 = 71yd. 1qr. Ans.

14. 71 × 4 = 284qr.; 284qr. + 1qr. = 285qr.; 285 ÷ 5 = 57 E. E. Ans.

15. 15 × 8 = 120fur.; 120fur. + 7fur. = 127fur.; 127 × 40 = 5080rd.; 5080rd. + 18rd. = 5098rd.; 5098 × 16½ = 84117ft.; 84117ft. + 10ft. = 84127ft.; 84127 × 12 = 1009524in.; 1009524in. + 6in. = 1009530in. Ans.

16. 1009530 ÷ 12 = 84127ft. 6in.; 84127 ÷ 16½ = 5098rd. 10ft.; 5098 ÷ 40 = 127fur. 18rd.; 127 ÷ 8 = 15m. 7fur.; 15m. 7fur. 18rd. 10ft. 6in. Ans.

17. 95000000 × 8 = 760000000fur.; 760000000 × 40 = 30400000000rd.; 30400000000 × 16½ = 501600000000ft.; 501600000000 × 12 = 6019200000000in. Ans.

18. 6019200000000 ÷ 12 = 501600000000ft.; 501600000000 ÷ 16½ = 30400000000rd.; 30400000000 ÷ 40 = 760000000fur.; 760000000 ÷ 8 = 95000000 miles, Ans.

19. 48 × 69⅙ = 3320m.; 3320m. + 18m. = 3338m.; 3338 × 8 = 26704fur.; 26704fur. + 7fur. = 26711fur.; 26711 × 40 = 1068440rd.; 1068440rd. + 18rd. = 1068458 × 16½ = 17629557ft. Ans.

20. 16½)17629557ft.
40)1068458rd.
8)26711fur. 18rd.
69⅙)3338m. 7fur.
48deg. 18m. 7fur. 18rd. Ans.

21. 7 × 4 = 28R.; 28R. + 3R. = 31R.; 31 × 40 = 1240

1240p. + 16p. = 1256p.; 1256 × 272¼ = 341946ft.; 341946ft. + 218ft. = 342164ft. Ans.

22. 342164 ÷ 272¼ = 1256p. 218ft.; 1256 ÷ 40 = 31R. 16p.; 31 ÷ 4 = 7A. 3R.; 7A. 3R. 16p. 218ft. Ans.

23. 25 × 640 = 16000A.; 16000 × 160 = 2560000p.; 2560000 × 272¼ = 696960000ft.; 696960000 × 144 = 100362240000in. Ans.

24. 100362240000 ÷ 144 = 696960000ft.; 696960000 ÷ 272¼ = 2560000p.; 2560000 ÷ 160 = 16000A.; 16000 ÷ 640 = 25 square miles, Ans.

25. 15 × 40 = 600ft.; 600 × 1728 = 10368000in. Ans.

26. 1036800 ÷ 1728 = 600ft.; 600 ÷ 40 = 15T. Ans.

27. 5 × 63 = 315gal.; 315gal. + 17gal. = 332gal.; 332 × 4 = 1328qt.; 1328qt. + 3qt. = 1331qt.; 1331 × 2 = 2662pt.; 2662 × 4 = 10648 gills, Ans.

28. 10648 ÷ 4 = 2662pt.; 2662 ÷ 2 = 1331qt.; 1331 ÷ 4 = 332gal. 3qt.; 332 ÷ 63 = 5hhd. 17gal.; 5hhd. 17gal. 3qt. Ans.

29. 29 × 54 = 1566gal.; 1566gal. + 30gal. = 1596gal.; 1596 × 4 = 6384qt.; 6384qt. + 3qt. = 6387qt. Ans.

30. 6387 ÷ 4 = 1596gal. 3qt.; 1596 ÷ 54 = 29hhd. 30gal.; 29hhd. 30gal. 3qt. Ans.

31. 15 × 36 = 540bu.; 540bu. + 16bu. = 556bu.; 556 × 4 = 2224pk.; 2224pk. + 3pk. = 2227pk.; 2227 × 8 = 17816qt.; 17816 × 2 = 35632pt. Ans.

32. 35632 ÷ 2 = 17816qt.; 17816 ÷ 8 = 2227pk.; 2227 ÷ 4 = 556bu. 3pk.; 556 ÷ 36 = 15ch. 16bu.; 15ch. 16bu. 3pk. Ans.

33. 365 × 24 = 8760h.; 8760h. + 6h. = 8766h.; 8766 × 60 = 525960m.; 525960 × 60 = 31557600 seconds, Ans.

34. 31557600 ÷ 60 = 525960m.; 525960 ÷ 60 = 8766h.; 8766 ÷ 24 = 365da. 6h. Ans.

35. 365 × 24 = 8760h.; 8760h. + 6h. = 8766h.; 8766 × 1842 = 16146972h. Ans.

36. 16146972 ÷ 8766 = 1842 years, Ans.

37. 8S. × 30 = 240°; 240° + 14° = 254°; 254 × 60 = 15240′; 15240′ + 18′ = 15258′; 15258 × 60 = 915480″; 915480″ + 17″ = 915497″, Ans.
38. 915497 ÷ 60 = 15258′ 17″; 15258 ÷ 60 = 254° 18′; 254 ÷ 30 = 8S. 14°; 8S. 14° 18′ 17″. Ans.
39. 13 × 144 × .02½ = $ 46.80, Ans.
40. 12 × 20 × .20 = $ 48.00, Ans.
41. 2 × 63 × 4 = 504qt.; 504 ÷ 3 = 168 bottles, Ans.
42. $ 1480.00 ÷ 25 = 59.20; $ 59.20 ÷ 160 = $ 0.37, cost of 1p.; 37A. 2R. 18p. = 6018p.; $ 0.37 × 6018 = $ 2226.66, Ans.
43. 5cwt. 3qr. 18lb. = 593lb.; 593 × 0.09 = $ 53.37; $ 1.75 × 25 = $ 43.75; $ 53.37 — $ 43.75 = $ 9.62, Ans.
44. 2lb. 7oz. = 31oz.; $ 46.50 ÷ 31 = $ 1.50, price per oz.; $ 1.50 × 12 = $ 18.00, price per pound, Ans.
45. 3T. 1cwt. 18lb. = 6118lb.; 6118 × 0.12 = $ 734.16; 6118 × 0.09 = $ 550.62; $ 734.16 — $ 550.62 = $ 183.54, Ans.
46. 37m. 7fur. 29rd. = 12149rd.; 12149 × 5.75 = $ 69856.75, Ans.
47. 15m. 6fur. 37rd. = 5077rd.; 5077 × 17.29 = $ 87,781.33, Ans.
48. 40p. 200ft. = 11090ft.; 11090 × 1.50 = $ 16,635, Ans.
49. 18ft. × 15 = 270 sq. ft.; 270 ÷ 9 = 30yd. Ans.
50. 47 × 10 = 470h.; 470h. + 7h. = 477h. = 28620m.; 28620 × 120 = 3434400 nails, Ans.
51. 80 × 50 = 4000 sq. rd.; 4000 ÷ 160 = 25 acres, Ans.
52. 18000000 ÷ 90 = 200000m. = 138da. 21h. 20m. Ans.
53. 9 × 15 × 23 = 3105yd.; 3105 × 0.08 = $ 248.40, Ans.
54. 6m. × 4½ = 27 sq. m.; 27 sq. m. = 17280A.; 17280 ÷ 90 = 192 lots, Ans.
55. 196d. 49m. = 282289m.; 282289 × 47 = 13267583 times, Ans.
56. 36ft. × 16 = 576 sq. ft.; 576 sq. ft. × 2 = 1152 sq. ft. = 165888in.; 165888 ÷ 27 = 6144 shingles, Ans.

57. 110m. = 6969600in.; 12ft. 6in. = 150in.; 6969600 ÷ 150 = 46464 times, Ans.

58. 25 × 7 × 5 × 12 × 15 × 178 = 28035000; 28035000 × 4.84 = $135689400, Ans.

59. 18 × 5½ = 99yd.; 99yd. + 5yd. = 104yd.; 104 × 3 = 312ft.; 312ft. + 2ft. = 314ft.; 314 × 12 = 3768in.; 3768in. + 11in. = 3779in. Ans.

60. 3779 ÷ 12 = 314ft. 11in.; 314 ÷ 3 = 104yd. 2ft.; 104 ÷ 5½ = 18rd. 5yd.; 18rd. 5yd. 2ft. 11in. Ans.

61. 5T. 17cwt. 3qr. 18lb. = 11793lb.; 11793 × 0.03 = $353.79, Ans.

62. 25 × 16 = 400 sq. rd. = 108900 sq. ft.; 108900 × 1.25 = $136,125; $136,125 — $100,000 = $36,125, Ans.

## ADDITION OF COMPOUND NUMBERS.

(Art. **101**, p. **111.**)

3. 191lb. 1oz. 19pwt. 15gr.

5. 234℔ 1℥ 2ʒ 1℈ 12gr.

7. 102T. 1cwt. 3qr. 9lb. 15oz. 10dr.

9. 189E.E. 0qr. 1na. 1¼in.

11. 74m. 3fur. 39rd. 2½yd. 2ft. 6in.
½yd. = 1ft. 6in.
74m. 3fur. 39rd. 3yd. 1ft. 0in.

13. 179m. 0fur. 6cha. 3p. 18l.

15. 162A. 0R. 2p. 17¼yd. 4ft. 83in.
¼yd. = 2ft. 36in.
162A. 0R. 2p. 17yd. 6ft. 119in.

17. 213C. 110ft. 1455in.

19. 193tun 2hhd. 27gal. 2qt. 0pt.

21. 211tun 0hhd. 53gal. 1qt. 1pt.

23. 211ch. 19bu. 3pk. 1qt. 1pt

25. 256w. 4da. 3h. 39m. 19s.

27. 11S. 0° 30′ 21″.

## SUBTRACTION OF COMPOUND NUMBERS.

(Art. **102**, p. **115.**)

3. 51£. 18s. 10d. 2far.

5. 691lb. 9oz. 4pwt. 22gr.

7. 63℔ 11℥ 1ʒ 1℈ 19gr.

9. 1T. 2cwt. 0qr. 24lb. 3oz. 14dr.

11. 151E.E. 4gr. 2na. 1¼in.

13. 8deg. 59$\frac{1}{6}$m. 1fur. 39rd. 2$\frac{1}{2}$ft. 10in.
$\frac{1}{2}$ft. = 6in.
8deg. 59$\frac{1}{6}$m. 1fur. 39rd. 3ft. 4in.
$\frac{1}{6}$m. = 1fur. 13rd. 5ft. 6in.
8deg. 59m. 3fur. 12rd. 8ft. 10in.

15. 13m. 5fur. 3cha. 1p. 21l.

17. 41A. 1R. 38p. 17$\frac{1}{4}$yd. 8ft. 143in.
$\frac{1}{4}$yd. = 2ft. 36in.
41A. 1R. 38p. 18yd. 2ft. 35in.

19. 871C. 126ft. 1683in.

21. 61tun 1hhd. 60gal. 1qt. 1pt. 2gi.

23. 59tun 2hhd. 42gal. 2qt. 1pt.

25. 53ch. 31bu. 1pk. 5qt. 0pt.

27. 4w. 1da. 9h. 26m. 27sec.

29. 4S. 7° 58′ 52″.

### (Art. 103, p. 118.)

(2.)

| y. | mo. | da. |
|---|---|---|
| 1857 | 0 | 6 |
| 1853 | 2 | 21 |
| 3 | 9 | 15 |

(3.)

| y. | mo. | da. |
|---|---|---|
| 1857 | 3 | 25 |
| 1852 | 10 | 15 |
| 4 | 5 | 10 |

(4.)

| y. | mo. | da. |
|---|---|---|
| 1848 | 1 | 23 |
| 1767 | 6 | 11 |
| 80 | 7 | 12 |

(5.)

| y. | mo. | da. |
|---|---|---|
| 1845 | 5 | 8 |
| 1767 | 2 | 15 |
| 78 | 2 | 23 |

---

## MISCELLANEOUS EXERCISES IN ADDITION AND SUBTRACTION OF COMPOUND NUMBERS.

### (Page 119.)

(1.)

| lb. | oz. | pwt. | gr. |
|---|---|---|---|
| 4 | 8 | 13 | 8 |
| 5 | 11 | 19 | 23 |
| 8 | 0 | 17 | 15 |
| 18 | 9 | 14 | 10 |
| 37 | 7 | 5 | 8 |

(2.)

| ℔ | ℥ | ʒ | ℈ | gr. |
|---|---|---|---|---|
| 7 | 3 | 2 | 2 | 1 |
| 2 | 10 | 0 | 1 | 13 |
| 2 | 3 | 7 | 2 | 17 |
| 12 | 5 | 3 | 0 | 11 |

(3.)

| T. | cwt. | qr. | lb. | oz. |
|---|---|---|---|---|
| 17 | 11 | 3 | 11 | 12 |
| 11 | 17 | 1 | 19 | 11 |
| 53 | 19 | 1 | 17 | 8 |
| 27 | 19 | 3 | 18 | 9 |
| 16 | 3 | 3 | 0 | 13 |
| 127 | 12 | 1 | 18 | 5 |

(4.)

| £. | s. | d. |
|---|---|---|
| 7671 | 0 | 0 |
| 1728 | 17 | 9 |
| 5942 | 2 | 3 |

(5.)

| lb. | oz. | pwt. | gr. |
|---|---|---|---|
| 73 | 0 | 0 | 0 |
| 26 | 11 | 13 | 14 |
| 46 | 0 | 6 | 10 |

(6.)

| ℔ | ℥ | ʒ | ℈ | gr |
|---|---|---|---|---|
| 71 | 8 | 1 | 1 | 14 |
| 7 | 9 | 1 | 1 | 17 |
| 63 | 10 | 7 | 2 | 17 |

(7.)

| T. | cwt. | qr. | lb. | oz. |
|---|---|---|---|---|
| 28 | 13 | 0 | 0 | 0 |
| 10 | 17 | 0 | 19 | 14 |
| 17 | 15 | 3 | 5 | 2 |

(8.)

| yd. | qr. | na. |
|---|---|---|
| 37 | 3 | 3 |
| 18 | 1 | 3 |
| 31 | 1 | 2 |
| 87 | 3 | 0 |

(9.)

| T. | cwt. | qr. | lb. |
|---|---|---|---|
| 2 | 13 | 1 | 17 |
| 3 | 0 | 0 | 17 |
| 1 | 0 | 3 | 11 |
| 6 | 14 | 1 | 20 |

(10.)

| m. | fur. | rd. | ft. | in. |
|---|---|---|---|---|
| 16 | 7 | 18 | 14 | 11 |
| 19 | 1 | 13 | 16 | 9 |
| 97 | 3 | 27 | 13 | 3 |
| 47 | 5 | 37 | 13 | 10 |
| 181 | 2 | 18 | 8½ | 9 |
|  |  |  | ½= | 6 |
| 181 | 2 | 18 | 9 | 3 |

**Note.** As 8½ feet and 9 inches are equal to 8 feet and 15 inches, so we find 8 feet 15 inches equal to 9 feet 3 inches.

(11.)

| yd. | qr. | na. |
|---|---|---|
| 76 | 0 | 0 |
| 18 | 3 | 2 |
| 57 | 0 | 2 |

(12.)

| m. | fur. | rd. | ft. | in. |
|---|---|---|---|---|
| 20 | 0 | 0 | 0 | 0 |
| 3 | 4 | 18 | 13 | 8 |
| 16 | 3 | 21 | 2½ | 4 |
|  |  |  | ½= | 6 |
| 16 | 3 | 21 | 2 | 10 |

**Note.** The half-foot, which is 6 inches, is added to the 4 inches, and their sum is 10 inches.

(13.)

| A. | R. | p. | ft. | in. |
|---|---|---|---|---|
| 144 | 3 | 0 | 0 | 0 |
| 18 | 1 | 17 | 200 | 100 |
| 126 | 1 | 22 | 71¼ | 44 |
|  |  |  | ¼= | 36 |
| 126 | 1 | 22 | 71 | 80 |

**Note.** The ¼ of a foot, which is 36 inches, is added to the 44 inches, and their sum is 80 inches.

(14.)

| cord. | ft. | in. |
|---|---|---|
| 18 | 0 | 0 |
| 3 | 100 | 1000 |
| 14 | 27 | 728 |

(15.)

| A. | R. | p. | ft. |
|---|---|---|---|
| 169 | 3 | 15 | 227 |
| 187 | 1 | 15 | 165 |
| 217 | 2 | 28 | 165 |
| 574 | 3 | 20 | 12½ |

(16.)

| cord. | ft. | in. |
|---|---|---|
| 18 | 116 | 1000 |
| 17 | 111 | 1600 |
| 21 | 109 | 1716 |
| 58 | 82 | 860 |

(17.)

| T. | ft. | in. |
|---|---|---|
| 17 | 0 | 0 |
| 5 | 18 | 765 |
| 11 | 21 | 963 |

(18.)

| gal. | qt. | pt. |
|---|---|---|
| 169 | 0 | 0 |
| 76 | 3 | 1 |
| 92 | 0 | 1 |

(19.)

| ch. | bu. | pk. | qt. |
|---|---|---|---|
| 17 | 18 | 0 | 0 |
| 5 | 20 | 1 | 7 |
| 11 | 33 | 2 | 1 |

(20.)

| y. | mo. | d. | h. | m. | s. |
|---|---|---|---|---|---|
| 83 | 0 | 0 | 0 | 0 | 0 |
| 47 | 10 | 27 | 18 | 50 | 14 |
| 35 | 1 | 2 | 5 | 9 | 46 |

(21.)

| s. | ° | ′ | ″ |
|---|---|---|---|
| 11 | 15 | 36 | 15 |
| 5 | 18 | 50 | 18 |
| 5 | 26 | 45 | 57 |

(22.)

| gal. | qt. | pt |
|---|---|---|
| 167 | 3 | 1 |
| 186 | 1 | 1 |
| 108 | 2 | 1 |
| 123 | 3 | 0 |
| 586 | 2 | 1 |

(23.)

| bu. | pk. | qt. | pt. |
|---|---|---|---|
| 17 | 1 | 7 | 1 |
| 18 | 3 | 2 | 0 |
| 19 | 1 | 3 | 1 |
| 51 | 3 | 0 | 1 |
| 107 | 1 | 5 | 1 |

(24.)

| y. | mo. | d. |
|---|---|---|
| 13 | 4 | 13 |
| 12 | 11 | 23 |
| 18 | 9 | 29 |
| 45 | 2 | 5 |

(25.)

| y. | d. | h. | m. | s. |
|---|---|---|---|---|
| 18 | 345 | 13 | 37 | 15 |
| 87 | 169 | 12 | 16 | 28 |
| 316 | 144 | 20 | 53 | 18 |
| 13 | 360 | 21 | 57 | 15 |
| 436 | 290 | 20 | 44 | 16 |

(27.)

| lb. | oz. | pwt. | gr. |
|---|---|---|---|
| 106 | 0 | 0 | 0 |
| 5 | 11 | 12 | 15 |
| 3 | 0 | 13 | 14 |
| 7 | 11 | 14 | 23 |
| 17 | 0 | 1 | 4 |
| 88 | 11 | 18 | 20 |

(28.)

| yd. | qr. | na. |
|---|---|---|
| 17 | 3 | 0 |
| 3 | 3 | 2 |
| 4 | 1 | 3 |
| 8 | 1 | 1 |
| 9 | 1 | 3 |

(29.)

| s. | ° | ′ | ″ |
|---|---|---|---|
| 3 | 18 | 45 | 15 |
| 7 | 15 | 36 | 18 |
| 5 | 21 | 38 | 27 |
| 4 | 26 | 0 | 0 |

**Note.** As this question is in Motion, it is necessary to reject the 12s in the sum of the signs.

(30.)

| s. | ° | ′ | ″ |
|---|---|---|---|
| 3 | 18 | 14 | 35 |
| 11 | 25 | 30 | 50 |
| 3 | 22 | 43 | 45 |

**Note.** To perform this question, we add 12 signs to the longitude of the star, and from their sum subtract the longitude of the planet, because all the planets move eastward, as seen from the sun.

# MULTIPLICATION OF COMPOUND NUMBERS.

## (Art. 106, p. 124.)

(3.)

| m. | fur. | rd. | |
|---|---|---|---|
| 3 | 7 | 18 | ×30=5×6 |
| | | 5 | |
| 19 | 5 | 10 | |
| | | 6 | |
| 117 | 7 | 20 | |

(4.)

| T. | cwt. | qr. | lb. | |
|---|---|---|---|---|
| 2 | 7 | 3 | 18 | ×84=7×12 |
| | | | 7 | |
| 16 | 15 | 2 | 1 | |
| | | | 12 | |
| 201 | 6 | 0 | 12 | |

(5.)

| yd. | qr. | na. | |
|---|---|---|---|
| 7 | 3 | 2 | ×72=6×12 |
| | | 6 | |
| 47 | 1 | 0 | |
| | | 12 | |
| 567 | 0 | 0 | |

(6.)

| yd. | qr. | na. | |
|---|---|---|---|
| 3 | 2 | 1 | ×132=12×11 |
| | | 12 | |
| 42 | 3 | 0 | |
| | | 11 | |
| 470 | 1 | 0 | |

## (Art. 107, p. 125.)

**Note.** It is sometimes more convenient to use as multipliers the nearest composite numbers than to follow the Rule.

(2.)

| lb. | oz. | dr. | |
|---|---|---|---|
| 17 | 10 | 13 | ×2 |
| | | 10 | |
| 176 | 12 | 2 | |
| | | 6 | |
| 1060 | 8 | 12 | =60 |
| 35 | 5 | 10 | = 2 |
| 1095 | 14 | 6 | =62 |

(3.)

| £. | s. | d. | |
|---|---|---|---|
| 2 | 17 | 9½ | ×7 |
| | | 10 | |
| 28 | 17 | 11 | |
| | | 9 | |
| 260 | 1 | 3 | =90 |
| 20 | 4 | 6½ | = 7 |
| 280 | 5 | 9½ | =97 |

(4.)

| m | fur. | rd. | yd. | ft. | in. | |
|---|---|---|---|---|---|---|
| 17 | 3 | 19 | 3 | 2 | 7 | ×8 |
| | | | | | 10 | |
| 174 | 2 | 36 | 5 | 1 | 10 | |
| | | | | | 3 | |
| 523 | 0 | 30 | 5 | 2 | 6 | =30 |
| 139 | 3 | 37 | 2½ | 2 | 8 | = 8 |
| 662 | 4 | 28 | 3 | 2 | 2 | =38 |

(5.)

| bu. | pk. | qt. | pt. | |
|---|---|---|---|---|
| 27 | 3 | 6 | 1 | ×8 |
| | | | 10 | |
| 279 | 2 | 1 | 0 | |
| | | | 9 | |
| 2515 | 3 | 1 | 0 | =90 |
| 223 | 2 | 4 | 0 | = 8 |
| 2739 | 1 | 5 | 0 | =98 |

(6.)

| yd. | qr. | na. | |
|---|---|---|---|
| 7 | 3 | 2 | ×7 |
| | | 10 | |
| 78 | 3 | 0 | ×4 |
| | | 10 | |
| 787 | 2 | 0 | |
| | | 3 | |
| 2362 | 2 | 0 | =300 |
| 315 | 0 | 0 | = 40 |
| 55 | 0 | 2 | = 7 |
| 2732 | 2 | 2 | =347 |

(7.)

| A. | R. | p. | yd. | ft. | in. | |
|---|---|---|---|---|---|---|
| 13 | 3 | 14 | 18 | 7 | 76 | ×1 |
| | | | | | 9 | |
| 124 | 2 | 11 | 17¾ | 4 | 108 | |
| | | | | | 2 | |
| 249 | 0 | 23 | 6¼ | 0 | 72 | =18 |
| 13 | 3 | 14 | 18 | 7 | 76 | = 1 |
| 262 | 3 | 37 | 24¼ | 8 | 4 | =19 |
| | | | ¼ | =2 | 36 | |
| 262 | 3 | 37 | 25 | 1 | 40 | =19 |

(8.)

| T. | cwt. | qr. | lb. | oz. | |
|---|---|---|---|---|---|
| 17 | 14 | 3 | 18 | 14 | ×1 |
| | | | | 10 | |
| 177 | 9 | 1 | 13 | 12 | ×5 |
| | | | | 10 | |
| 1774 | 13 | 3 | 12 | 8 | |
| | | | | 4 | |
| 7098 | 15 | 2 | 0 | 0 | =400 |
| 887 | 6 | 3 | 18 | 12 | = 50 |
| 17 | 14 | 3 | 18 | 14 | = 1 |
| 8003 | 17 | 1 | 12 | 10 | 451 |

## DIVISION OF COMPOUND NUMBERS.

(Art. 110, p. 127.

(2.)

| £. | s. | d. |
|---|---|---|
| 6)6409 | 10 | 0 |
| 6)1068 | 5 | 0 |
| 10)178 | 0 | 10 |
| 17 | 16 | 1 |

(3.)

| m. | fur. | rd. |
|---|---|---|
| 5)117 | 7 | 20 |
| 6)23 | 4 | 28 |
| 3 | 7 | 18 |

(4.)

| T. | cwt. | qr. | lb. |
|---|---|---|---|
| 12)201 | 6 | 6 | 12 |
| 7)16 | 15 | 2 | 1 |
| 2 | 7 | 3 | 18 |

(5.)

| yd. | qr. | n. |
|---|---|---|
| 6)567 | 0 | 0 |
| 12)94 | 2 | 0 |
| 7 | 3 | 2 |

(6.)

| yd. | qr. | na. |
|---|---|---|
| 12)470 | 1 | 0 |
| 11)39 | 0 | 3 |
| 3 | 2 | 1 |

## (Art. 111, p. 128.)

### (2.)

lb. oz. dr.<br>
62)1095 14 6(17lb.<br>
62<br>
475<br>
434<br>
41<br>
16<br>
250<br>
42<br>
62)670(10oz.<br>
62<br>
50<br>
16<br>
306<br>
50<br>
62)806(13dr.<br>
62<br>
186<br>
186

### (3.)

£ s. d.<br>
97)280 5 9½(2£<br>
194<br>
86<br>
20<br>
97)1725(17s.<br>
97<br>
755<br>
679<br>
76<br>
12<br>
97)921(9d.<br>
873<br>
48<br>
4<br>
97)194(2far.<br>
194

### (4.)

m. fur. rd. yd. ft. in.<br>
38)662 4 28 3 2 2(17m.<br>
38<br>
282<br>
266<br>
16<br>
8<br>
38)132(3fur.<br>
114<br>
18<br>
40<br>
38)748(19rd.<br>
38<br>
368<br>
342<br>
26<br>
5½<br>
133<br>
13<br>
38)146(3yd.<br>
114<br>
32<br>
3<br>
38)98(2ft.<br>
76<br>
22<br>
12<br>
38)266(7in.<br>
266

### (5.)

bu. pk. qt. pt.<br>
98)2739 1 5 0(27bu.<br>
196<br>
779<br>
686<br>
93<br>
4<br>
98)373(3pk.<br>
294<br>
79<br>
8<br>
98)637(6qt.<br>
588<br>
49<br>
2<br>
98)98(1pt.<br>
98

### (6.)

yd. qr. na.<br>
347)2732 2 2(7yd.<br>
2429<br>
303<br>
4<br>
347)1214(3qr.<br>
1041<br>
173<br>
4<br>
347)694(2na.<br>
694

(7.)

A. R. p. yd. ft. in.
19)262 3 37 25 1 40(13A.
19
72
57
15
4
19)63(3R.
57
6
40
19)277(14p.
19
87
76
11
30$\frac{1}{4}$
355
2$\frac{3}{4}$
19)357$\frac{3}{4}$(18yd.
19
167
152
15$\frac{3}{4}$
9
19)142$\frac{3}{4}$(7ft.
133
9$\frac{3}{4}$
144
36
36
940
108
1444
(Carried up.)

(Brought up.)
19)1444(76in.
133
114
114

(8.)

T. cwt. qr. lb. oz.
451)8003 8 1 0 10(17T.
451
3493
3157
336
20
451)6728(14cwt.
451
2218
1804
414
4
451)1657(3qr.
1353
304
25
1520
608
451)7600(16lb.
451
3090
2706
384
16
2304
385
451)6154(13oz.
451
1644
1353
291

## MISCELLANEOUS EXAMPLES IN MULTIPLICATION AND DIVISION OF COMPOUND NUMBERS.

(Art. 111, p. 129.)

(1.)

| cwt. | qr. | lb. |
|---|---|---|
| 8 | 3 | 20 |
| | | 5 |
| 44 | 3 | 0 |
| | | 6 |
| 268 | 2 | 0 |
| 68 | 2 | 0 |
| 200 | 0 | 0 |

| £. | s. | d. | |
|---|---|---|---|
| 1 | 17 | 6 | |
| | | 10 | |
| 18 | 15 | 0 | |
| | | 10 | |
| 187 | 10 | 0 | |
| | | 2 | |
| 375 | 0 | 0 | Ans. |

(2.)

| | A. | R. | P. |
|---|---|---|---|
| 12) | 11067 | 1 | 8 |
| 12) | 922 | 1 | 4 |
| | 76 | 3 | 17 |
| | 4 | | |
| | 307R. | | |
| | 40 | | |
| | 12297p. | | |

| | £. | s. | d. | |
|---|---|---|---|---|
| | 0 | 1 | 9½×7 | |
| | | | 10 | |
| | 0 | 17 | 11×9 | |
| | | | 10 | |
| | 8 | 19 | 2×2 | |
| | | | 10 | |
| | 89 | 11 | 8×2 | |
| | | | 10 | |
| | 895 | 16 | 8 | =10000 |
| | 179 | 3 | 4 | = 2000 |
| | 17 | 18 | 4 | = 200 |
| | 8 | 1 | 3 | = 90 |
| | | 12 | 6½ | = 7 |
| Ans. | 1101 | 12 | 1½ | =12297 |

(3.)

| m. | fur. | rd. |
|---|---|---|
| 18 | 7 | 32 |
| | | 10 |
| 189 | 6 | 0 |
| | | 10 |
| 1897 | 4 | 0 |

| m. | fur. | rd. | |
|---|---|---|---|
| 2644 | 3 | 12 | |
| 1897 | 4 | 0 | |
| 746 | 7 | 12 | Ans. |

(4.)

| y. |
|---|
| 1807 |
| 1798 |
| 9y. |

| d. | |
|---|---|
| 365 | |
| 9 | |
| 3285d. | |
| 1 | add for leap year. |
| 67 | " from July 4 to [Sept. 9 |
| 3353 days. | |

| h. | m. | |
|---|---|---|
| 11 | 19 | P. M. |
| 3 | 17 | A. M. |
| 20 | 2 | |

Ans. 3353d. 20h. 2m.

(5.)

3124rd. × 8 = 24992rd. = 78m. 0fur. 32rd.

| | m. | fur. | rd |
|---|---|---|---|
| | 121 | 5 | 0 |
| | 78 | 0 | 32 |
| Ans. | 43 | 4 | 8 |

(6.)

| cwt. | qr. | lb. | |
|---|---|---|---|
| 7 | 3 | 18 | |
| | | 16 | |
| 126 | 3 | 13 | = 12688lb. |
| 71 | 1 | 12 | |
| 55 | 2 | 1 | = 5551lb. |

| cwt. | qr. | lb. | |
|---|---|---|---|
| 7 | 3 | 18 | |
| | | 9 | |
| 71 | 1 | 12 | = 7137lb. |

7137 × 6 = $ 428.22
5551 × 7 = 388.57
$ 816.79

12688 × 5 = $ 634.40
Ans. $ 182.39

(7.)

| £. | s. | d. | |
|---|---|---|---|
| 17 | 18 | 10 | |
| | | 17 | |
| 305 | 0 | 2 | |
| 270 | 0 | 0 | |
| 35 | 0 | 2 | Ans. |

| £. | s. | d. |
|---|---|---|
| 1 | 17 | 6 |
| | | 144 |
| 270 | 0 | 0 |

(8.)

| m. | fur. | rd. | |
|---|---|---|---|
| 17 | 4 | 30 | |
| | | 10 | |
| 175 | 7 | 20 | |
| 124 | 3 | 0 | |
| 51 | 4 | 20 | |
| 50 | | | |
| 1 | 4 | 20 | Ans. |

| m. | fur. | rd. |
|---|---|---|
| 12 | 3 | 20 |
| | | 10 |
| 124 | 3 | 0 |

(9.)

$ 5.75 × 760 = $ 4370;
4370 ÷ .02 = 218500lb.;
218500lb. ÷ 2 = 109250lb.;
109250lb. = 54T. 12cwt. 2qr.
Ans.

(10.)

| A. | R. | p. | ft. |
|---|---|---|---|
| 0 | 0 | 44 | 200 |
| | | | 17 |
| 4 | 3 | 0 | 133 |
| 2 | 2 | 0 | 240 |
| 2 | 0 | 39 | 165¼ |

| A. | R. | p. | ft. | |
|---|---|---|---|---|
| 2 | 0 | 39 | 165¼ | = 97903ft. |

1s. 2½d. × 97903 = 5914£. 19s. 5½d. Ans.

(11.)

100 × 100 = 10000 sq. rd. 3563 × $ 1.75 = $ 6235.25 Ans.
5A.3R. 17p. = 937
50 × 50 = 2500
3000
6437
3563 sq. rd.

(12.)

78A. 3R. 30p. = 12630p.; 30 × 30 × 10 = 9000p.; 9000 × 8.50 = $ 76500; 12630p. — 9000p. = 3630p.; 3630 × 272¼ = 988267½ft.; 988267½ × 0.02 = $ 19765.35; $ 76500 + $ 19765.35 = $ 96265.35.; $ 96265.35 — $ 7000 = $ 89265.35, Ans.

---

## CANCELLATION.

(Art. 117, p. 135.)

5. $\frac{\overset{2}{\cancel{8}}\times\cancel{6}\times\cancel{3}}{\cancel{6}\times\cancel{3}\times\cancel{4}}=2.$

6. $\frac{\cancel{17}\times\cancel{6}\times\cancel{2}}{\cancel{6}\times\cancel{2}\times\cancel{17}}=1.$

7. $\frac{\cancel{15}\times30\times\cancel{10}}{\cancel{10}\times\cancel{15}}=30.$

10. $\frac{\overset{3}{\cancel{9}}\times\overset{2}{\cancel{8}}\times\cancel{2}\times\overset{2}{\cancel{14}}}{\cancel{3}\times\cancel{4}\times\underset{\cancel{2}}{\cancel{6}}\times\cancel{7}}=4.$

11. $\frac{\overset{\cancel{2}}{\cancel{16}}\times5\times\overset{5}{\cancel{10}}\times\overset{\cancel{3}}{\cancel{18}}}{\cancel{8}\times\cancel{6}\times\cancel{2}\times\underset{2}{\cancel{12}}}=\frac{25}{2}$ [$=12\frac{1}{2}$.

12. $\frac{\overset{\cancel{2}}{\cancel{22}}\times\overset{3}{\cancel{9}}\times\overset{\cancel{2}}{\cancel{12}}\times5}{\cancel{3}\times\cancel{11}\times\cancel{6}\times\cancel{4}}=15.$

13. $\frac{\overset{5}{\cancel{25}}\times7\times\overset{\cancel{2}}{\cancel{14}}\times\overset{\cancel{9}}{\cancel{36}}}{\cancel{4}\times\underset{\cancel{2}}{\cancel{10}}\times\underset{3}{\cancel{21}}\times\underset{6}{\cancel{54}}}=\frac{35}{18}$ [$=1\frac{17}{18}$.

14. $\frac{\overset{\cancel{2}}{\cancel{26}}\times\overset{3}{\cancel{72}}\times\overset{\cancel{9}}{\cancel{81}}\times\overset{\cancel{2}}{\cancel{12}}}{\underset{\cancel{4}}{\cancel{36}}\times\cancel{13}\times\cancel{24}\times\underset{\cancel{6}}{\cancel{54}}}=3.$

16. $\frac{\overset{2}{\cancel{8}}\times\cancel{4}\times\cancel{9}\times\cancel{2}\times\cancel{12}\times\cancel{16}\times\cancel{5}}{\cancel{4}\times\cancel{6}\times\cancel{6}\times\cancel{3}\times\cancel{8}\times\cancel{4}\times\cancel{20}}=2$

17. $$\frac{\cancel{6}\times\cancel{15}\times\overset{8}{\cancel{16}}\times\cancel{24}\times\cancel{12}\times\overset{7}{\cancel{21}}\times\cancel{27}}{\cancel{2}\times\cancel{10}\times\cancel{9}\times\cancel{8}\times\underset{3}{\cancel{36}}\times\cancel{7}\times\underset{3}{\cancel{81}}}=8.$$

(ART. **124**, p. **138.**)

(2.)
85)95(1
85
10)85(8
80
5)10(2
10

(3.)
72)168(2
144
24)72(3
72

(4.)
119)121(1
119
2)119(59
118
1)2(2
2

(5.)
12)18(1
12
6)12(2
12

(5.)
6)24(4
24

(5.)
6)30(5
30

(6.)
12)15(1
12
3)12(4
12

3)18(6
18

(ART. **128**, p. **140.**)

(3.)
2)3, 4, 5, 6, 7, 8
3)3, 2, 5, 3, 7, 4
2)1, 2, 5, 1, 7, 4
1, 1, 5, 1, 7, 2

2×3×2×5×7×2 = 840 Ans.

(4.)
4)10, 12, 16, 20, 24
2)10, 3, 4 5 6
3) 5, 3, 2, 5, 3
5) 5, 1, 2, 5, 1
1, 1, 2, 1, 1

4×2×3×5×2 = 240 Ans.

(5.)
2)9 8 12 18 24 36 72
3)9 4 6 9 12 18 36
2)3 4 2 3 4 6 12
3)3 2 1 3 2 3 6
2)1 2 1 1 2 1 2
1 1 1 1 1 1 1

2×3×2×3×2=72 Ans.

(5. By Cancellation.)
$)\cancel{9}\ \cancel{8}\ \cancel{12}\ \cancel{18}\ \cancel{24}\ \cancel{36}\ 72$

Ans. 72.

(6.)
$2)\cancel{10}$ 12 16 18 20
2)6 8 9 10
3)3 4 9 5
1 4 3 5

2×2×3×4×3×5 = 720 days.

## COMMON FRACTIONS.

2. (Art. 135, p. 142.) $\frac{1}{5}$
3. $\frac{2}{3}$
4. $\frac{1}{3}$
5. $\frac{2}{3}$
6. $\frac{1}{2}$
7. $\frac{123}{386}$
8. $\frac{1}{7}$
9. $\frac{7891}{8116}$
10. $\frac{173}{309}$

2. (Art. 136, p. 143.) $\frac{52}{7}$
3. $\frac{13}{4}$
4. $\frac{103}{11}$
5. $\frac{91}{11}$
6. $\frac{187}{12}$
7. $\frac{169}{9}$
8. $\frac{18848}{117}$
9. $\frac{5142}{117}$
10. $\frac{360}{13}$
11. $\frac{12322}{111}$
12. $\frac{125}{1}$
13. $\frac{150}{6}$
14. $\frac{675}{9}$
15. $\frac{343}{1}$
16. $\frac{1260}{15}$

2. (Art. 137, p. 144.) 12
3. $10\frac{8}{17}$
4. $10\frac{1}{111}$
5. $1\frac{858}{876}$
6. $142\frac{6}{7}$
7. 1
8. 567
9. $9\frac{32}{79}$
10. $4\frac{4}{153}$

(Art. 138, p. 145.)

3. $\frac{2}{\cancel{3}} \times \frac{4}{5} \times \frac{\overset{2}{\cancel{6}}}{7} = \frac{16}{35}$ Ans.

4. $\frac{7}{8} \times \frac{9}{11} \times \frac{7}{1} = \frac{441}{88} = 5\frac{1}{88}$ [Ans.

5. $\frac{\cancel{7}}{\underset{2}{\cancel{8}}} \times \frac{9}{11} \times \frac{3}{8} \times \frac{\cancel{4}}{\cancel{7}} = \frac{27}{176}$ Ans.

6. $\frac{11}{17} \times \frac{1}{2} \times \frac{3}{4} \times \frac{1}{20} \times \frac{7}{1} = \frac{231}{2720}$ [Ans.

7. $\frac{3}{5} \times \frac{\cancel{4}}{\cancel{11}} \times \frac{\cancel{11}}{\cancel{17}} \times \frac{\cancel{17}}{\cancel{23}} \times \frac{\cancel{23}}{\cancel{4}} = \frac{3}{5}$ [Ans.

8. $\frac{1}{\cancel{5}} \times \frac{\cancel{8}}{\cancel{9}} \times \frac{\cancel{9}}{11} \times \frac{\cancel{5}}{\cancel{8}} \times \frac{3}{7} = \frac{3}{77}$ [Ans.

9. $\frac{\cancel{3}}{\cancel{7}} \times \frac{\overset{2}{\cancel{4}}}{11} \times \frac{\cancel{7}}{\cancel{9}} \times \frac{\cancel{9}}{\underset{5}{\cancel{10}}} \times \frac{13}{\cancel{3}} =$ [$\frac{26}{55}$ Ans.

10. $\frac{\overset{5}{\cancel{15}}}{\underset{2}{\cancel{16}}} \times \frac{\cancel{8}}{\underset{3}{\cancel{9}}} \times \frac{7}{11} = \frac{35}{66}$ Ans.

11. $\frac{\cancel{8}}{\cancel{11}} \times \frac{\cancel{22}}{\underset{7}{\cancel{35}}} \times \frac{\overset{3}{\cancel{15}}}{\cancel{22}} \times \frac{\overset{11}{\cancel{77}}}{\cancel{8}} = 3$ [Ans.

12. $\frac{\cancel{5}}{\cancel{7}} \times \frac{\cancel{3}}{\cancel{15}} \times \frac{\cancel{4}}{16} \times \frac{\overset{\cancel{5}}{\cancel{35}}}{\cancel{4}} \times \frac{11}{\cancel{5}} =$ [$\frac{11}{16}$ Ans.

### (Art. 140, p. 147.)

(2.)

$$\begin{array}{l} 3 \times 6 = 18 = \frac{18}{24} = \frac{9}{12} \\ 5 \times 4 = 20 = \frac{20}{24} = \frac{10}{12} \\ \hline 4 \times 6 = 24 \end{array}$$

(3.)

$$\begin{array}{l} 7 \times 5 \times 2 = 70 = \frac{70}{90} \\ 4 \times 9 \times 2 = 72 = \frac{72}{90} \\ 1 \times 9 \times 5 = 45 = \frac{45}{90} \\ \hline 9 \times 5 \times 2 = 90 \end{array}$$

(4.)

$$\begin{array}{l} 4 \times 8 \times 11 = 352 = \frac{352}{616} \\ 3 \times 7 \times 11 = 231 = \frac{231}{616} \\ 5 \times 7 \times 8 = 280 = \frac{280}{616} \\ \hline 7 \times 8 \times 11 = 616 \end{array}$$

(5.)

$$\begin{array}{l} 8 \times 12 \times 3 = 288 = \frac{288}{324} \\ 5 \times 9 \times 3 = 135 = \frac{135}{324} \\ 2 \times 9 \times 12 = 216 = \frac{216}{324} \\ \hline 9 \times 12 \times 3 = 324 \end{array}$$

(6.)

$$\begin{array}{l} 1 \times 5 \times 8 \times 4 = 160 = \frac{160}{960} \\ 2 \times 6 \times 8 \times 4 = 384 = \frac{384}{960} \\ 7 \times 6 \times 5 \times 4 = 840 = \frac{840}{960} \\ 1 \times 6 \times 5 \times 8 = 240 = \frac{240}{960} \\ \hline 6 \times 5 \times 8 \times 4 = 960 \end{array}$$

### (Art. 141, p. 148.)

(2.)

$$\frac{3}{4},\ \frac{4}{5},\ \frac{5}{6},\ \frac{7}{8}$$

$$\begin{array}{r|rrrr} 2 & 4 & 5 & 6 & 8 \\ \hline 2 & 2 & 5 & 3 & 4 \\ \hline & 1 & 5 & 3 & 2 \end{array}$$

$$2 \times 2 \times 5 \times 3 \times 2 = 120$$

$$\begin{array}{r|l} & 120 \\ \hline 4 & 30 \times 3 = 90 \\ 5 & 24 \times 4 = 96 \\ 6 & 20 \times 5 = 100 \\ 8 & 15 \times 7 = 105 \end{array}$$

$\frac{90}{120}$, $\frac{96}{120}$, $\frac{100}{120}$, $\frac{105}{120}$ Ans.

(3.)

$$\frac{3}{4},\ \frac{2}{5},\ \frac{4}{9},\ \frac{2}{11}$$

$$4 \times 5 \times 9 \times 11 = 1980$$

$$\begin{array}{r|l} & 1980 \\ \hline 4 & 495 \times 3 = 1485 \\ 5 & 396 \times 2 = 792 \\ 9 & 220 \times 4 = 880 \\ 11 & 180 \times 2 = 360 \end{array}$$

$\frac{1485}{1980}$, $\frac{792}{1980}$, $\frac{880}{1980}$, $\frac{360}{1980}$ Ans.

(4.)

$$\frac{7}{8},\ \frac{9}{10},\ \frac{31}{4}$$

$$\begin{array}{r|rrr}
4 & 8 & 10 & 4 \\ \hline
2 & 2 & 10 & 1 \\ \hline
 & 1 & 5 & 1
\end{array}$$

$4 \times 2 \times 5 = 40$

$$\begin{array}{r|l}
 & \underline{40} \\
8 & 5 \times 7 = 35 \\
10 & 4 \times 9 = 36 \\
4 & 10 \times 31 = 310
\end{array}$$

$\frac{35}{40}, \frac{36}{40}, \frac{310}{40}$ Ans.

(5.)

$$\frac{3}{7},\ \frac{9}{14},\ \frac{11}{28},\ \frac{38}{7}$$

$$\begin{array}{r|rrrr}
7 & 7 & 14 & 28 & 7 \\ \hline
2 & 1 & 2 & 4 & 1 \\ \hline
 & 1 & 1 & 2 & 1
\end{array}$$

$7 \times 2 \times 2 = 28$

$$\begin{array}{r|l}
 & \underline{28} \\
7 & 4 \times 3 = 12 \\
14 & 2 \times 9 = 18 \\
28 & 1 \times 11 = 11 \\
7 & 4 \times 38 = 152
\end{array}$$

$\frac{12}{28}, \frac{18}{28}, \frac{11}{28}, \frac{152}{28}$ Ans

(6.)

$$\frac{1}{2},\ \frac{3}{4},\ \frac{5}{6},\ \frac{5}{8},\ \frac{7}{8},\ \frac{5}{12}$$

$$\begin{array}{r|rrrrrr}
2 & 2 & 4 & 6 & 8 & 8 & 12 \\ \hline
3 & 1 & 2 & 3 & 4 & 4 & 6 \\ \hline
2 & 1 & 2 & 1 & 4 & 4 & 2 \\ \hline
2 & 1 & 1 & 1 & 2 & 2 & 1 \\ \hline
 & 1 & 1 & 1 & 1 & 1 & 1
\end{array}$$

$2 \times 3 \times 2 \times 2 = 24$

$$\begin{array}{r|l}
 & \underline{24} \\
2 & 12 \times 1 = 12 \\
4 & 6 \times 3 = 18 \\
6 & 4 \times 5 = 20 \\
8 & 3 \times 5 = 15 \\
8 & 3 \times 7 = 21 \\
12 & 2 \times 5 = 10
\end{array}$$

$\frac{12}{24}, \frac{18}{24}, \frac{20}{24}, \frac{15}{24}, \frac{21}{24}, \frac{10}{24}$ Ans.

(7.)

$$\frac{4}{9},\ \frac{2}{3},\ \frac{1}{3},\ \frac{1}{4},\ \frac{1}{6},\ \frac{1}{12}$$

$$\begin{array}{r|rrrrrr}
3 & 9 & 3 & 3 & 4 & 6 & 12 \\ \hline
2 & 3 & 1 & 1 & 4 & 2 & 4 \\ \hline
2 & 3 & 1 & 1 & 2 & 1 & 2 \\ \hline
 & 3 & 1 & 1 & 1 & 1 & 1
\end{array}$$

$3 \times 2 \times 2 \times 3 = 36$

$$\begin{array}{r|l}
 & \underline{36} \\
9 & 4 \times 4 = 16 \\
3 & 12 \times 2 = 24 \\
3 & 12 \times 1 = 12 \\
4 & 9 \times 1 = 9 \\
6 & 6 \times 1 = 6 \\
12 & 3 \times 1 = 3
\end{array}$$

$\frac{16}{36}, \frac{24}{36}, \frac{12}{36}, \frac{9}{36}, \frac{6}{36}, \frac{3}{36}$ Ans.

(8.)

$\frac{5}{6}, \frac{4}{9}, \frac{7}{12}$

$$\begin{array}{rrrr} 3) & 6 & 9 & 12 \\ \cline{2-4} 2) & 2 & 3 & 4 \\ \cline{2-4} & 1 & 3 & 2 \end{array}$$

$3\times2\times3\times2=36$

$$\begin{array}{r|l} & \underline{36} \\ 6 & 6\times5=30 \\ 9 & 4\times4=16 \\ 12 & 3\times7=21 \end{array}$$

$\frac{30}{36}, \frac{16}{36}, \frac{21}{36}$ Ans.

(9.)

$7\frac{3}{4}, 5\frac{6}{11}, 7, 8=\frac{31}{4}, \frac{61}{11}, \frac{7}{1}, \frac{8}{1}$

$4\times11=44$

$$\begin{array}{r|l} & \underline{44} \\ 4 & 11\times31=341 \\ 11 & 4\times61=244 \\ 1 & 44\times\ 7=308 \\ 1 & 44\times\ 8=352 \end{array}$$

$\frac{341}{44}, \frac{244}{44}, \frac{308}{44}, \frac{352}{44}$ Ans.

(10.)

$\frac{3}{4}, 4, 5, 7, 9=\frac{3}{4}, \frac{4}{1}, \frac{5}{1}, \frac{7}{1}, \frac{9}{1}$

$$\begin{array}{r|l} & \underline{4} \\ 4 & 1\times3=\ \ 3 \\ 1 & 4\times4=16 \\ 1 & 4\times5=20 \\ 1 & 4\times7=28 \\ 1 & 4\times9=36 \end{array}$$

$\frac{3}{4}, \frac{16}{4}, \frac{20}{4}, \frac{28}{4}, \frac{36}{4}$ Ans.

**2.** (**Art. 143, p. 149.**) $3\frac{10}{11}$

**3.** $2\frac{1}{17}$

**4.** $2\frac{1}{25}$

**5.** $2\frac{18}{47}$

**6.** $1\frac{112}{137}$

**7.** $1\frac{1061}{1771}$

(**Art. 144, p. 149.**)

(2.)

$$\begin{array}{rrrr} 4) & 8 & 12 & 16 \\ \cline{2-4} 2) & 2 & 3 & 4 \\ \cline{2-4} & 1 & 3 & 2 \end{array}$$

$4\times2\times3\times2=48$

$$\begin{array}{r|l} & \underline{48} \\ 8 & 6\times\ 5=30 \\ 12 & 4\times11=44 \\ 16 & 3\times13=\underline{39} \end{array}$$

$$\frac{113}{48}=2\tfrac{17}{48} \text{ Ans.}$$

(3.)

$$\begin{array}{rrrr} 2) & 20 & 18 & 14 \\ \cline{2-4} & 10 & 9 & 7 \end{array}$$

$2\times10\times9\times7=1260$

$$\begin{array}{r|l} & \underline{1260} \\ 20 & 63\times\ 9=567 \\ 18 & 70\times11=770 \\ 14 & 90\times\ 5=\underline{450} \end{array}$$

$$\frac{1787}{1260}=1\tfrac{527}{1260}$$

[Ans.

(4.)

$$21 \times 37 = 777$$

$$\begin{array}{r|l} & \underline{777} \\ 21 & 37 \times 19 = 703 \\ 37 & 21 \times 31 = \underline{651} \end{array}$$

$$\frac{1354}{777} = 1\tfrac{577}{777}$$ [Ans.

(5.)

$$\begin{array}{r|rrrr} 4) & 4 & 6 & 8 & 12 \\ \hline 3) & 1 & 6 & 2 & 3 \\ \hline 2) & 1 & 2 & 2 & 1 \\ \hline & 1 & 1 & 1 & 1 \end{array}$$

$$4 \times 2 \times 3 = 24$$

$$\begin{array}{r|l} & \underline{24} \\ 4 & 6 \times 3 = 18 \\ 6 & 4 \times 5 = 20 \\ 8 & 3 \times 3 = \phantom{0}9 \\ 12 & 2 \times 1 = \underline{\phantom{0}2} \end{array}$$

$$\frac{49}{24} = 2\tfrac{1}{24}$$ Ans.

(6.)

$$\begin{array}{r|rrrr} 3) & 9 & 21 & 24 & 2 \\ \hline 2) & 3 & 7 & 8 & 2 \\ \hline & 3 & 7 & 4 & 1 \end{array}$$

$$3 \times 2 \times 3 \times 7 \times 4 = 504$$

$$\begin{array}{r|l} & \underline{504} \\ 9 & 56 \times 4 = 224 \\ 21 & 24 \times 8 = 192 \\ 24 & 21 \times 11 = 231 \\ 2 & 252 \times 1 = \underline{252} \end{array}$$

$$\frac{899}{504} = 1\tfrac{395}{504}$$ [Ans.

(7.)

$$\begin{array}{r|rrr} 12) & 72 & 84 & 96 \\ \hline 2) & 6 & 7 & 8 \\ \hline & 3 & 7 & 4 \end{array}$$

$$12 \times 2 \times 3 \times 7 \times 4 = 2016$$

$$\begin{array}{r|l} & \underline{2016} \\ 72 & 28 \times 19 = \phantom{0}532 \\ 84 & 24 \times 51 = 1224 \\ 96 & 21 \times 71 = \underline{1491} \end{array}$$

$$\frac{3247}{2016} = 1\tfrac{1231}{2016}$$ [Ans.

(8.)

$$\begin{array}{r|rrrr} 25) & 25 & 50 & 75 & 100 \\ \hline 2) & 1 & 2 & 3 & 4 \\ \hline & 1 & 1 & 3 & 2 \end{array}$$

$$25 \times 2 \times 3 \times 2 = 300$$

$$\begin{array}{r|l} & \underline{300} \\ 25 & 12 \times 3 = \phantom{0}36 \\ 50 & 6 \times 49 = 294 \\ 75 & 4 \times 74 = 296 \\ 100 & 3 \times 81 = \underline{243} \end{array}$$

$$\frac{869}{300} = 2\tfrac{269}{300}$$ Ans.

(9.)

$$\begin{array}{r|rrrrrrr} 2) & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ \hline 2) & 1 & 3 & 2 & 5 & 3 & 7 & 4 \\ \hline 3) & 1 & 3 & 1 & 5 & 3 & 7 & 2 \\ \hline & 1 & 1 & 1 & 5 & 1 & 7 & 2 \end{array}$$

$2\times2\times3\times5\times7\times2=840$

$$\begin{array}{r|l} & 840 \\ \hline 2 & 420\times1=420 \\ 3 & 280\times2=560 \\ 4 & 210\times3=630 \\ 5 & 168\times4=672 \\ 6 & 140\times5=700 \\ 7 & 120\times6=720 \\ 8 & 105\times7=\underline{735} \\ & \qquad\quad 4437 \end{array}$$

$\frac{4437}{840}=5\frac{79}{280}$ Ans.

(10.)

$$\begin{array}{r|rrrrrrr} 3) & 9 & 10 & 11 & 12 & 13 & 14 & 15 \\ \hline 2) & 3 & 10 & 11 & 4 & 13 & 14 & 5 \\ \hline 5) & 3 & 5 & 11 & 2 & 13 & 7 & 5 \\ \hline & 3 & 1 & 11 & 2 & 13 & 7 & 1 \end{array}$$

$3\times2\times5\times3\times11\times2\times13\times7=180180$

$$\begin{array}{r|l} & 180180 \\ \hline 9 & 20020\times8=160160 \\ 10 & 18018\times9=162162 \\ 11 & 16380\times10=163800 \\ 12 & 15015\times11=165165 \\ 13 & 13860\times12=166320 \\ 14 & 12870\times13=167310 \\ 15 & 12012\times14=\underline{168168} \\ & \qquad\qquad\quad 1153085 \end{array}$$

$\frac{1158085}{180180}=6\frac{14401}{36036}$ Ans.

(11.)

$\frac{2}{3}\times\frac{3}{4}=\frac{6}{12}=\frac{1}{2}$

$\frac{5}{6}\times\frac{7}{8}=\frac{35}{48}$

$$\begin{array}{r|rr} 2) & 2 & 48 \\ \hline & 1 & 24 \end{array}$$

$2\times24=48$

$$\begin{array}{r|l} & 48 \\ \hline 2 & 24\times1=24 \\ 48 & 1\times35=\underline{35} \\ & \qquad\quad 59 \end{array}$$

$\frac{59}{48}=1\frac{11}{48}$ Ans.

(12.)

$\frac{3}{4}\times\frac{7}{8}=\frac{21}{32}$; $\frac{11}{12}\times\frac{1}{2}=\frac{11}{24}$

$$\begin{array}{r|rr} 8) & 32 & 24 \\ \hline & 4 & 3 \end{array}$$

$8\times4\times3=96$

$$\begin{array}{r|l} & 96 \\ \hline 32 & 3\times21=63 \\ 24 & 4\times11=\underline{44} \\ & \qquad\quad 107 \end{array}$$

$\frac{107}{96}=1\frac{11}{96}$ Ans.

(13.)

$\frac{1}{9}\times\frac{2}{3}=\frac{2}{27}$; $\frac{1}{5}\times\frac{7}{10}=\frac{7}{50}$

$27\times50=1350$

$$\begin{array}{r|l} & 1350 \\ \hline 27 & 50\times2=100 \\ 50 & 27\times7=\underline{189} \\ & \qquad\quad 289 \end{array}$$

$\frac{289}{1350}$ Ans.

(14.)

$$\frac{2}{\cancel{3}}\times\frac{\cancel{3}}{\cancel{4}}\times\frac{\cancel{4}}{5}=\frac{2}{5}$$

$$\frac{5}{\cancel{6}}\times\frac{\cancel{6}}{\cancel{7}}\times\frac{\cancel{7}}{10}=\frac{5}{10}=\frac{1}{2}$$

$$2\times 5=10$$

$$\begin{array}{r|l} & 10 \\ 5 & 2\times 2=4 \\ 2 & 5\times 1=\underline{5} \end{array}$$

$$\frac{9}{10}\text{ Ans.}$$

(15.)

$$\frac{1}{\cancel{3}}\times\frac{\cancel{3}}{\cancel{11}}\times\frac{\cancel{11}}{12}=\frac{1}{12}$$

$$\frac{1}{\cancel{2}}\times\frac{\cancel{2}}{9}=\frac{1}{9}$$

$$\begin{array}{r} 3\underline{)12\quad 9} \\ 4\quad 3 \end{array}$$

$$3\times 4\times 3=36$$

$$\begin{array}{r|l} & \underline{36} \\ 12 & 3\times 1=3 \\ 9 & 4\times 1=\underline{4} \end{array}$$

$$\frac{7}{36}\text{ Ans.}$$

(16.)

$$3\tfrac{3}{7}=\tfrac{24}{7};\ 4\tfrac{11}{14}=\tfrac{67}{14}$$

$$\begin{array}{r} 7\underline{)7\quad 14} \\ 1\quad 2 \end{array}$$

$$7\times 2=14$$

$$\begin{array}{r|l} & \underline{14} \\ 7 & 2\times 24=48 \\ 14 & 1\times 67=\underline{67} \end{array}$$

$$\frac{115}{14}=8\tfrac{3}{14}\text{ Ans.}$$

(17.)

$$4\tfrac{3}{4}=\tfrac{19}{4};\ 5\tfrac{6}{7}=\tfrac{41}{7}$$

$$4\times 7=28$$

$$\begin{array}{r|l} & \underline{28} \\ 4 & 7\times 19=133 \\ 7 & 4\times 41=\underline{164} \end{array}$$

$$\frac{297}{28}=10\tfrac{17}{28}\text{ Ans}$$

(18.)

$$17\tfrac{3}{4}=\tfrac{71}{4};\ 18\tfrac{5}{12}=\tfrac{221}{12}$$

$$\begin{array}{r} 4\underline{)4\quad 12} \\ 1\quad 3 \end{array}$$

$$4\times 3=12$$

$$\begin{array}{r|l} & \underline{12} \\ 4 & 3\times 71=213 \\ 12 & 1\times 221=\underline{221} \end{array}$$

$$\frac{434}{12}=36\tfrac{1}{6}\text{ Ans.}$$

(ART. 147, p. 151.)

2. $\frac{5}{11}$
3. $\frac{4}{19}$
4. $\frac{23}{37}$
5. $\frac{148}{711}$
6. $\frac{239}{864}$
7. $\frac{1}{10}$
8. $\frac{4}{5}$

## SUBTRACTION OF COMMON FRACTIONS.

(Art. 148, p. 152.)

(2.)

$\frac{7}{18}-\frac{4}{21}$ $\quad 3)\underline{18\ \ 21}$ $\quad 6\ \ 7$

$3\times6\times7=126$

$$\begin{array}{r|l} & \underline{126} \\ 18 & 7\times7=49 \\ 21 & 6\times4=\underline{24} \end{array}$$

$\frac{25}{126}$ Ans.

(3.)

$\frac{19}{20}-\frac{11}{16}$ $\quad 4)\underline{20\ \ 16}$ $\quad 5\ \ 4$

$4\times5\times4=80$

$$\begin{array}{r|l} & \underline{80} \\ 20 & 4\times19=76 \\ 16 & 5\times11=\underline{55} \end{array}$$

$\frac{21}{80}$ Ans.

(4.)

$\frac{17}{24}-\frac{7}{20}$ $\quad 4)\underline{24\ \ 20}$ $\quad 6\ \ 5$

$4\times6\times5=120$

$$\begin{array}{r|l} & \underline{120} \\ 24 & 5\times17=85 \\ 20 & 6\times\ 7=\underline{42} \end{array}$$

$\frac{43}{120}$ Ans.

(5.)

$\frac{11}{34}-\frac{1}{10}$ $\quad 2)\underline{34\ \ 10}$ $\quad 17\ \ 5$

$2\times17\times5=170$

$$\begin{array}{r|l} & \underline{170} \\ 34 & 5\times11=55 \\ 10 & 17\times\ 1=\underline{17} \end{array}$$

$\frac{38}{170}=\frac{19}{85}$ Ans.

(6.)

$\frac{31}{36}-\frac{9}{16}$ $\quad 4)\underline{36\ \ 16}$ $\quad 9\ \ 4$

$4\times9\times4=144$

$$\begin{array}{r|l} & \underline{144} \\ 36 & 4\times31=124 \\ 16 & 9\times\ 9=\underline{81} \end{array}$$

$\frac{43}{144}$ Ans.

(7.)

$\frac{18}{37}-\frac{3}{11}$ $\quad 37\times11=407$

$$\begin{array}{r|l} & \underline{407} \\ 37 & 11\times18=198 \\ 11 & 37\times\ 3=\underline{111} \end{array}$$

$\frac{87}{407}$ Ans.

(8.)

$\frac{111}{200}-\frac{1}{19}$ $\quad 200\times19=3800$

$$\begin{array}{r|l} & \underline{3800} \\ 200 & 19\times111=2109 \\ 19 & 200\times\ 1=\underline{200} \end{array}$$

$\frac{1909}{3800}$ Ans.

(9.)

$\frac{1}{10}-\frac{1}{1000}$ $\quad 10)\underline{10\ \ 1000}$ $\quad 1\ \ 100$

$10\times100=1000$

$$\begin{array}{r|l} & \underline{1000} \\ 10 & 100\times1=100 \\ 1000 & 1\times1=\underline{\ \ 1} \end{array}$$

$\frac{99}{1000}$ Ans.

(10.)

$\frac{2}{3}\times\frac{9}{11}=\frac{18}{33}=\frac{6}{11}$; $\frac{1}{4}\times\frac{2}{7}=\frac{2}{28}=\frac{1}{14}$

$\frac{6}{11}-\frac{1}{14}$ $\qquad 11\times14=154$

$$\begin{array}{r|l} & 154 \\ \hline 11 & 14\times6=84 \\ 14 & 11\times1=11 \\ & \overline{\quad 73} \end{array}$$

$\frac{73}{154}$ Ans.

(11.)

$\frac{1}{\cancel{9}}\times\frac{\cancel{9}}{10}=\frac{1}{10}$; $\frac{1}{\cancel{12}}\times\frac{\cancel{12}}{13}=\frac{1}{13}$

$\frac{1}{10}-\frac{1}{13}$ $\qquad 10\times13=130$

$$\begin{array}{r|l} & 130 \\ \hline 10 & 13 \\ 13 & 10 \\ & \overline{\ 3} \end{array}$$

$\frac{3}{130}$ Ans.

(12.)

$\frac{3}{8}\times12\frac{5}{6}=\frac{3}{8}\times\frac{77}{6}=\frac{231}{48}=\frac{77}{16}$; $\frac{2}{5}\times9\frac{7}{12}=\frac{2}{5}\times\frac{115}{12}=\frac{230}{60}=\frac{23}{6}$; $\frac{77}{16}-\frac{23}{6}$

$$\begin{array}{r|ll} 2) & 16 & 6 \\ \hline & 8 & 3 \end{array}$$

$2\times8\times3=48$

$$\begin{array}{r|l} & 48 \\ \hline 16 & 3\times77=231 \\ 6 & 8\times23=184 \\ & \overline{\qquad\quad 47} \end{array}$$

$\frac{47}{48}$ Ans.

(Art. **149**, p. **152**.)

7. From 23<br>
Take $13\frac{1}{3}$<br>
Ans. $9\frac{2}{3}$

8. 47<br>
$\frac{13}{20}$<br>
Ans. $46\frac{7}{20}$

9. 139<br>
$75\frac{11}{25}$<br>
Ans. $63\frac{14}{25}$

(Art. **150**, p. **154**.)

**Note.** In the following questions, the new numerator is found by multiplying each numerator by the denominator of the other fraction; and the common denominator is obtained by multiplying together the two denominators.

(12.)<br>
$19\frac{1}{6}=19\frac{11}{66}$<br>
$7\frac{3}{11}=\ 7\frac{18}{66}$<br>
Ans. $11\frac{59}{66}$

(13.)<br>
$15\frac{1}{7}=15\frac{4}{28}$<br>
$8\frac{1}{4}=\ 8\frac{7}{28}$<br>
Ans. $6\frac{25}{28}$

(14.)<br>
$9\frac{1}{13}=9\frac{19}{247}$<br>
$3\frac{18}{19}=3\frac{234}{247}$<br>
Ans. $5\frac{32}{247}$

(15.)<br>
$71\frac{1}{15}=71\frac{12}{180}$<br>
$13\frac{7}{12}=13\frac{105}{180}$<br>
Ans. $57\frac{87}{180}$

(16.)

$$\begin{array}{r} 61\frac{11}{17} = 61\frac{154}{238} \\ 33\frac{13}{14} = 33\frac{221}{238} \\ \hline \text{Ans. } 27\frac{171}{238} \end{array}$$

(17.)

$$\begin{array}{r} 63 \\ 12\frac{3}{8} \\ \hline \text{Ans. } 50\frac{5}{8} \end{array}$$

(18.)

$$\begin{array}{r} 2\frac{1}{8} = 2\frac{1}{8} \\ 3\frac{1}{4} = 3\frac{2}{8} \\ 1\frac{1}{2} = 1\frac{4}{8} \\ \hline 6\frac{7}{8} \end{array} \qquad \begin{array}{r} 10 \\ 6\frac{7}{8} \\ \hline \text{Ans. } 3\frac{1}{8} \end{array}$$

(**Art. 153, p. 155.**)

| | | | |
|---|---|---|---|
| 2. | $6\frac{3}{7}$ | 8. | $352\frac{61}{117}$ |
| 3. | $2\frac{2}{3}$ | 9. | $43\frac{1}{2}$ |
| 4. | $1\frac{7}{9}$ | 10. | \$ $7\frac{7}{8}$ |
| 5. | 49 | 11. | \$ 0.42 |
| 6. | $76\frac{1}{12}$ | 12. | \$ 3.24 |
| 7. | $166\frac{13}{17}$ | 13. | \$ $69\frac{1}{8}$ |

(**Art. 154, p. 156.**)

| | | | |
|---|---|---|---|
| 2. | 28 | 6. | $243\frac{5}{17}$ |
| 3. | 88 | 7. | $8\frac{2}{39}$ |
| 4. | 325 | 8. | $23\frac{20}{37}$ |
| 5. | 1610 | 9. | $6\frac{51}{136}$ |

(**Art. 155, p. 157.**)

(3.)

$$\begin{array}{r} 9\frac{3}{8} \\ 5 \\ \hline 45 \\ 1\frac{7}{8} \\ \hline \text{Ans. } 46\frac{7}{8} \end{array} \qquad \begin{array}{r} 3 \\ 5 \\ \hline 8)15 \\ \hline 1\frac{7}{8} \end{array}$$

(4.)

$$\begin{array}{r} 12\frac{3}{5} \\ 7 \\ \hline 84 \\ 4\frac{1}{5} \\ \hline \text{Ans. } 88\frac{1}{5} \end{array} \qquad \begin{array}{r} 3 \\ 7 \\ \hline 5)21 \\ \hline 4\frac{1}{5} \end{array}$$

(5.)

$$\begin{array}{r} 8\frac{11}{12} \\ 9 \\ \hline 72 \\ 8\frac{1}{4} \\ \hline \text{Ans. } 80\frac{1}{4} \end{array} \qquad \begin{array}{r} 11 \\ 9 \\ \hline 12)99 \\ \hline 8\frac{1}{4} \end{array}$$

(6.)

$$\begin{array}{r} 7\frac{1}{9} \\ 10 \\ \hline 70 \\ 1\frac{1}{9} \\ \hline \text{Ans. } 71\frac{1}{9} \end{array} \qquad \begin{array}{r} 1 \\ 10 \\ \hline 9)10 \\ \hline 1\frac{1}{9} \end{array}$$

(7.)

$$\begin{array}{r} 11\frac{6}{7} \\ 8 \\ \hline 88 \\ 6\frac{6}{7} \\ \hline \text{Ans. } 94\frac{6}{7} \end{array} \qquad \begin{array}{r} 6 \\ 8 \\ \hline 7)48 \\ \hline 6\frac{6}{7} \end{array}$$

(8.)

$$\begin{array}{r} 7\frac{6}{11} \\ 5 \\ \hline 35 \\ 2\frac{8}{11} \\ \hline \text{Ans. } \$\,.37\frac{8}{11} \end{array} \qquad \begin{array}{r} 6 \\ 5 \\ \hline 11)30 \\ \hline 2\frac{8}{11} \end{array}$$

(9 )

$$\begin{array}{r} 23\frac{7}{12} \\ 6 \\ \hline 138 \\ 3\frac{1}{2} \\ \hline \text{Ans. } \$141\frac{1}{2} \end{array} \qquad \begin{array}{r} 7 \\ 6 \\ \hline 12)42 \\ \hline 3\frac{1}{2} \end{array}$$

(10.)

$$\begin{array}{r} 8\frac{3}{8} \\ 5 \\ \hline 40 \\ 1\frac{7}{8} \\ \hline \text{Ans. } \$\,41\frac{7}{8} \end{array} \qquad \begin{array}{r} 3 \\ 5 \\ \hline 8)15 \\ \hline 1\frac{7}{8} \end{array}$$

(11 )

$$\begin{array}{r} \$\,6\frac{3}{8} \\ 9 \\ \hline 54 \\ 3\frac{3}{8} \\ \hline \text{Ans. } \$\,57\frac{3}{8} \end{array} \qquad \begin{array}{r} 3 \\ 9 \\ \hline 8)27 \\ \hline 3\frac{3}{8} \end{array}$$

## COMMON FRACTIONS.

| | | | |
|---|---|---|---|
| 2. (Art. 135, p. 142.) | $\frac{1}{5}$ | 7. | $\frac{123}{388}$ |
| 3. | $\frac{2}{9}$ | 8. | $\frac{1}{7}$ |
| 4. | $\frac{1}{8}$ | 9. | $\frac{7891}{8116}$ |
| 5. | $\frac{2}{3}$ | 10. | $\frac{173}{309}$ |
| 6. | $\frac{1}{2}$ | | |

| | | | |
|---|---|---|---|
| 2. (Art. 136, p. 143.) | $\frac{52}{7}$ | 10. | $\frac{360}{13}$ |
| 3. | $\frac{13}{4}$ | 11. | $\frac{12322}{111}$ |
| 4. | $\frac{103}{11}$ | 12. | $\frac{125}{1}$ |
| 5. | $\frac{91}{11}$ | 13. | $\frac{150}{8}$ |
| 6. | $\frac{187}{12}$ | 14. | $\frac{675}{9}$ |
| 7. | $\frac{169}{9}$ | 15. | $\frac{343}{1}$ |
| 8. | $\frac{18848}{117}$ | 16. | $\frac{1260}{15}$ |
| 9. | $\frac{5142}{117}$ | | |

| | | | |
|---|---|---|---|
| 2. (Art. 137, p. 144.) | 12 | 7. | 1 |
| 3. | $10\frac{8}{17}$ | 8. | 567 |
| 4. | $10\frac{1}{111}$ | 9. | $9\frac{32}{79}$ |
| 5. | $1\frac{859}{876}$ | 10. | $4\frac{4}{153}$ |
| 6. | $142\frac{6}{7}$ | | |

### (Art. 138, p. 145.)

3. $\frac{2}{\cancel{3}} \times \frac{4}{5} \times \frac{\overset{2}{\cancel{6}}}{7} = \frac{16}{35}$ Ans.

4. $\frac{7}{8} \times \frac{9}{11} \times \frac{7}{1} = \frac{441}{88} = 5\frac{1}{88}$ [Ans.

5. $\frac{\cancel{7}}{\underset{2}{\cancel{8}}} \times \frac{9}{11} \times \frac{3}{8} \times \frac{\cancel{4}}{\cancel{7}} = \frac{27}{176}$ Ans.

6. $\frac{11}{17} \times \frac{1}{2} \times \frac{3}{4} \times \frac{1}{20} \times \frac{7}{1} = \frac{231}{2720}$ [Ans.

7. $\frac{3}{5} \times \frac{\cancel{4}}{\cancel{11}} \times \frac{\cancel{11}}{\cancel{17}} \times \frac{\cancel{17}}{\cancel{23}} \times \frac{\cancel{23}}{\cancel{4}} = \frac{3}{5}$ [Ans.

8. $\frac{1}{\cancel{5}} \times \frac{\cancel{8}}{\cancel{9}} \times \frac{\cancel{9}}{11} \times \frac{\cancel{5}}{\cancel{8}} \times \frac{3}{7} = \frac{3}{77}$ [Ans.

9. $\frac{\cancel{3}}{\cancel{7}} \times \frac{\overset{2}{\cancel{4}}}{11} \times \frac{\cancel{7}}{\cancel{9}} \times \frac{\cancel{9}}{\cancel{10}} \times \frac{13}{\cancel{3}} =$
5 [$\frac{26}{55}$ Ans.

10. $\frac{\overset{5}{\cancel{15}}}{\underset{2}{\cancel{16}}} \times \frac{\cancel{8}}{\underset{3}{\cancel{9}}} \times \frac{7}{11} = \frac{35}{66}$ Ans.

11. $\frac{\cancel{8}}{\cancel{11}} \times \frac{\cancel{22}}{\underset{\cancel{7}}{\cancel{35}}} \times \frac{\overset{3}{\cancel{15}}}{\cancel{22}} \times \frac{\overset{\cancel{11}}{\cancel{77}}}{\cancel{8}} = 3$ [Ans.

12. $\frac{\cancel{5}}{\cancel{7}} \times \frac{\cancel{3}}{\cancel{15}} \times \frac{\cancel{4}}{16} \times \frac{\overset{\cancel{5}}{\cancel{35}}}{\cancel{4}} \times \frac{11}{\cancel{5}} =$
[$\frac{11}{16}$ Ans.

## (ART. 140, p. 147.)

(2.)

$$\begin{array}{l} 3 \times 6 = 18 = \frac{18}{24} = \frac{9}{12} \\ 5 \times 4 = 20 = \frac{20}{24} = \frac{10}{12} \\ \hline 4 \times 6 = 24 \end{array}$$

(3.)

$$\begin{array}{l} 7 \times 5 \times 2 = 70 = \frac{70}{90} \\ 4 \times 9 \times 2 = 72 = \frac{72}{90} \\ 1 \times 9 \times 5 = 45 = \frac{45}{90} \\ \hline 9 \times 5 \times 2 = 90 \end{array}$$

(4.)

$$\begin{array}{l} 4 \times 8 \times 11 = 352 = \frac{352}{616} \\ 3 \times 7 \times 11 = 231 = \frac{231}{616} \\ 5 \times 7 \times 8 = 280 = \frac{280}{616} \\ \hline 7 \times 8 \times 11 = 616 \end{array}$$

(5.)

$$\begin{array}{l} 8 \times 12 \times 3 = 288 = \frac{288}{324} \\ 5 \times 9 \times 3 = 135 = \frac{135}{324} \\ 2 \times 9 \times 12 = 216 = \frac{216}{324} \\ \hline 9 \times 12 \times 3 = 324 \end{array}$$

(6.)

$$\begin{array}{l} 1 \times 5 \times 8 \times 4 = 160 = \frac{160}{960} \\ 2 \times 6 \times 8 \times 4 = 384 = \frac{384}{960} \\ 7 \times 6 \times 5 \times 4 = 840 = \frac{840}{960} \\ 1 \times 6 \times 5 \times 8 = 240 = \frac{240}{960} \\ \hline 6 \times 5 \times 8 \times 4 = 960 \end{array}$$

## (ART. 141, p. 148.)

(2.)

$$\frac{3}{4},\ \frac{4}{5},\ \frac{5}{6},\ \frac{7}{8}$$

$$\begin{array}{r|llll} 2) & 4 & 5 & 6 & 8 \\ \hline 2) & 2 & 5 & 3 & 4 \\ \hline & 1 & 5 & 3 & 2 \end{array}$$

$$2 \times 2 \times 5 \times 3 \times 2 = 120$$

$$\begin{array}{r|l} & 120 \\ \hline 4 & 30 \times 3 = 90 \\ 5 & 24 \times 4 = 96 \\ 6 & 20 \times 5 = 100 \\ 8 & 15 \times 7 = 105 \end{array}$$

$\frac{90}{120}, \frac{96}{120}, \frac{100}{120}, \frac{105}{120}$ Ans.

(3.)

$$\frac{3}{4},\ \frac{2}{5},\ \frac{4}{9},\ \frac{2}{11}$$

$$4 \times 5 \times 9 \times 11 = 1980$$

$$\begin{array}{r|l} & 1980 \\ \hline 4 & 495 \times 3 = 1485 \\ 5 & 396 \times 2 = 792 \\ 9 & 220 \times 4 = 880 \\ 11 & 180 \times 2 = 360 \end{array}$$

$\frac{1485}{1980}, \frac{792}{1980}, \frac{880}{1980}, \frac{360}{1980}$ Ans.

(4.)

$\frac{7}{8}, \frac{9}{10}, \frac{31}{4}$

$$\begin{array}{r|rrr} 4 & 8 & 10 & 4 \\ \hline 2 & 2 & 10 & 1 \\ \hline & 1 & 5 & 1 \end{array}$$

$4 \times 2 \times 5 = 40$

$$\begin{array}{r|l} & \underline{40} \\ 8 & 5 \times 7 = 35 \\ 10 & 4 \times 9 = 36 \\ 4 & 10 \times 31 = 310 \end{array}$$

$\frac{35}{40}, \frac{36}{40}, \frac{310}{40}$ Ans.

(5.)

$\frac{3}{7}, \frac{9}{14}, \frac{11}{28}, \frac{38}{7}$

$$\begin{array}{r|rrrr} 7 & 7 & 14 & 28 & 7 \\ \hline 2 & 1 & 2 & 4 & 1 \\ \hline & 1 & 1 & 2 & 1 \end{array}$$

$7 \times 2 \times 2 = 28$

$$\begin{array}{r|l} & \underline{28} \\ 7 & 4 \times 3 = 12 \\ 14 & 2 \times 9 = 18 \\ 28 & 1 \times 11 = 11 \\ 7 & 4 \times 38 = 152 \end{array}$$

$\frac{12}{28}, \frac{18}{28}, \frac{11}{28}, \frac{152}{28}$ Ans

(6.)

$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{5}{8}, \frac{7}{8}, \frac{5}{12}$

$$\begin{array}{r|rrrrrr} 2 & 2 & 4 & 6 & 8 & 8 & 12 \\ \hline 3 & 1 & 2 & 3 & 4 & 4 & 6 \\ \hline 2 & 1 & 2 & 1 & 4 & 4 & 2 \\ \hline 2 & 1 & 1 & 1 & 2 & 2 & 1 \\ \hline & 1 & 1 & 1 & 1 & 1 & 1 \end{array}$$

$2 \times 3 \times 2 \times 2 = 24$

$$\begin{array}{r|l} & \underline{24} \\ 2 & 12 \times 1 = 12 \\ 4 & 6 \times 3 = 18 \\ 6 & 4 \times 5 = 20 \\ 8 & 3 \times 5 = 15 \\ 8 & 3 \times 7 = 21 \\ 12 & 2 \times 5 = 10 \end{array}$$

$\frac{12}{24}, \frac{18}{24}, \frac{20}{24}, \frac{15}{24}, \frac{21}{24}, \frac{10}{24}$ Ans.

(7.)

$\frac{4}{9}, \frac{2}{3}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{12}$

$$\begin{array}{r|rrrrrr} 3 & 9 & 3 & 3 & 4 & 6 & 12 \\ \hline 2 & 3 & 1 & 1 & 4 & 2 & 4 \\ \hline 2 & 3 & 1 & 1 & 2 & 1 & 2 \\ \hline & 3 & 1 & 1 & 1 & 1 & 1 \end{array}$$

$3 \times 2 \times 2 \times 3 = 36$

$$\begin{array}{r|l} & \underline{36} \\ 9 & 4 \times 4 = 16 \\ 3 & 12 \times 2 = 24 \\ 3 & 12 \times 1 = 12 \\ 4 & 9 \times 1 = 9 \\ 6 & 6 \times 1 = 6 \\ 12 & 3 \times 1 = 3 \end{array}$$

$\frac{16}{36}, \frac{24}{36}, \frac{12}{36}, \frac{9}{36}, \frac{6}{36}, \frac{3}{36}$ Ans.

(8.)

$\frac{5}{6}, \frac{4}{9}, \frac{7}{12}$

$$\begin{array}{r|rrr} 3 & 6 & 9 & 12 \\ \hline 2 & 2 & 3 & 4 \\ \hline & 1 & 3 & 2 \end{array}$$

$3\times2\times3\times2=36$

$$\begin{array}{r|l} & \underline{36} \\ 6 & 6\times5=30 \\ 9 & 4\times4=16 \\ 12 & 3\times7=21 \end{array}$$

$\frac{30}{36}, \frac{16}{36}, \frac{21}{36}$ Ans.

(9.)

$7\frac{3}{4}, 5\frac{6}{11}, 7, 8 = \frac{31}{4}, \frac{61}{11}, \frac{7}{1}, \frac{8}{1}$

$4\times11=44$

$$\begin{array}{r|l} & \underline{44} \\ 4 & 11\times31=341 \\ 11 & 4\times61=244 \\ 1 & 44\times7=308 \\ 1 & 44\times8=352 \end{array}$$

$\frac{341}{44}, \frac{244}{44}, \frac{308}{44}, \frac{352}{44}$ Ans.

(10.)

$\frac{3}{4}, 4, 5, 7, 9 = \frac{3}{4}, \frac{4}{1}, \frac{5}{1}, \frac{7}{1}, \frac{9}{1}$

$$\begin{array}{r|l} & \underline{4} \\ 4 & 1\times3=3 \\ 1 & 4\times4=16 \\ 1 & 4\times5=20 \\ 1 & 4\times7=28 \\ 1 & 4\times9=36 \end{array}$$

$\frac{3}{4}, \frac{16}{4}, \frac{20}{4}, \frac{28}{4}, \frac{36}{4}$ Ans.

2. (**Art. 143**, p. **149.**) $3\frac{10}{11}$ | 5. $2\frac{19}{47}$
3. $2\frac{1}{17}$ | 6. $1\frac{112}{137}$
4. $2\frac{1}{25}$ | 7. $1\frac{1061}{1771}$

(**Art. 144**, p. **149.**)

(2.)

$$\begin{array}{r|rrr} 4 & 8 & 12 & 16 \\ \hline 2 & 2 & 3 & 4 \\ \hline & 1 & 3 & 2 \end{array}$$

$4\times2\times3\times2=48$

$$\begin{array}{r|l} & \underline{48} \\ 8 & 6\times5=30 \\ 12 & 4\times11=44 \\ 16 & 3\times13=\underline{39} \\ & \qquad\quad 113 \end{array}$$

$\frac{113}{48}=2\frac{17}{48}$ Ans.

(3.)

$$\begin{array}{r|rrr} 2 & 20 & 18 & 14 \\ \hline & 10 & 9 & 7 \end{array}$$

$2\times10\times9\times7=1260$

$$\begin{array}{r|l} & \underline{1260} \\ 20 & 63\times9=567 \\ 18 & 70\times11=770 \\ 14 & 90\times5=\underline{450} \\ & \qquad\quad 1787 \end{array}$$

$\frac{1787}{1260}=1\frac{527}{1260}$ Ans.

4. $11\frac{1}{4} = \frac{45}{4}$; $5\frac{3}{7} = \frac{38}{7}$; $\frac{45}{4} \times \frac{7}{38} = \frac{315}{152} = 2\frac{11}{152}$ Ans.

5. $4\frac{3}{7} = \frac{31}{7}$; $1\frac{7}{9} = \frac{16}{9}$; $\frac{31}{7} \times \frac{9}{16} = \frac{279}{112} = 2\frac{55}{112}$ Ans.

6 $116\frac{3}{7} = \frac{815}{7}$; $14\frac{1}{7} = \frac{99}{7}$; $\frac{815}{\cancel{7}} \times \frac{\cancel{7}}{99} = \frac{815}{99} = 8\frac{23}{99}$ Ans.

7. $81\frac{1}{7} = \frac{568}{7}$; $9\frac{1}{5} = \frac{46}{5}$; $\frac{\overset{284}{\cancel{568}}}{7} \times \frac{5}{\underset{23}{\cancel{46}}} = \frac{1420}{161} = 8\frac{132}{161}$ Ans.

8. $\frac{3}{5} \times \frac{11}{2} \times \frac{7}{1} = \frac{231}{10}$; $\frac{\cancel{5}}{8} \times \frac{33}{\underset{2}{\cancel{10}}} = \frac{33}{16}$; $\frac{\overset{7}{\cancel{231}}}{\underset{5}{\cancel{10}}} \times \frac{\overset{8}{\cancel{16}}}{\cancel{33}} = \frac{56}{5} = 11\frac{1}{5}$ [Ans.

## (Art. 165, p. 165.)

(4.)

$$\frac{12}{\frac{3}{7}} = \frac{\overset{4}{\cancel{12}}}{1} \times \frac{7}{\cancel{3}} = \frac{28}{1} = 28 \text{ Ans.}$$

(5.)

$$\frac{\frac{3}{7}}{14} = \frac{3}{7} \times \frac{1}{14} = \frac{3}{98} \text{ Ans.}$$

(6.)

$$\frac{4\frac{7}{8}}{9} = \frac{\overset{13}{\cancel{39}}}{8} \times \frac{1}{\underset{3}{\cancel{9}}} = \frac{13}{24} \text{ Ans.}$$

(7.)

$$\frac{\frac{3}{4}}{\frac{11}{12}} = \frac{3}{\cancel{4}} \times \frac{\overset{3}{\cancel{12}}}{11} = \frac{9}{11} \text{ Ans.}$$

(8.)

$$\frac{\frac{5}{6}}{7\frac{3}{4}} = \frac{5}{\underset{3}{\cancel{6}}} \times \frac{\overset{2}{\cancel{4}}}{31} = \frac{10}{93} \text{ Ans.}$$

(9.)

$$\frac{8\frac{3}{4}}{\frac{2}{5}} = \frac{35}{4} \times \frac{5}{2} = \frac{175}{8} = 21\frac{7}{8} \text{ Ans}$$

(10.)

$$\frac{9\frac{3}{5}}{12\frac{1}{2}} = \frac{48}{5} \times \frac{2}{25} = \frac{96}{125} \text{ Ans.}$$

(11.)

$$\frac{\frac{9\frac{1}{4}}{12\frac{7}{8}}}{7} = \frac{37}{\cancel{4}} \times \frac{\overset{2}{\cancel{8}}}{103} \times \frac{1}{7} = \frac{74}{721} \text{ Ans}$$

(12.)

$$\frac{\frac{3}{4}}{\frac{\frac{8}{9}}{\frac{1}{2}}} = \frac{3}{4} \times \frac{9}{8} \times \frac{1}{2} = \frac{27}{64} \text{ Ans.}$$

## (Art. 166, p. 166.)

1. $\frac{\frac{1}{3}}{\frac{3}{7}} = \frac{1}{3} \times \frac{7}{3} = \frac{7}{9}$; $\frac{4\frac{1}{7}}{12\frac{1}{2}} = \frac{29}{7} \times \frac{2}{25} = \frac{58}{175}$; $\frac{7}{9} + \frac{58}{175} = \frac{1225}{1575} + \frac{522}{1575} = \frac{1747}{1575} = 1\frac{172}{1575}$ Ans.

2 $\frac{7\frac{3}{4}}{\frac{4}{7}} = \frac{31}{4} \times \frac{7}{4} = \frac{217}{16}$; $\frac{7}{\frac{7}{12}} = \frac{\cancel{7}}{1} \times \frac{12}{\cancel{7}} = \frac{12}{1}$; $\frac{217}{16} + \frac{12}{1} = \frac{217}{16}$
$+ \frac{192}{16} = \frac{409}{16} = 25\frac{9}{16}$ Ans.

3. $\frac{\frac{3}{7}}{8\frac{1}{2}} = \frac{3}{7} \times \frac{2}{17} = \frac{6}{119}$; $\frac{1}{9} \times \frac{2}{9} = \frac{2}{81}$; $\frac{6}{119} - \frac{2}{81} = \frac{486}{9639} -$
$\frac{238}{9639} = \frac{248}{9639}$ Ans.

4. $\frac{6\frac{3}{4}}{\frac{3}{4}} = \frac{\overset{9}{\cancel{27}}}{\cancel{4}} \times \frac{\cancel{4}}{\cancel{3}} = \frac{9}{1}$; $\frac{\frac{1}{9}}{\frac{3}{8}} = \frac{1}{9} \times \frac{8}{3} = \frac{8}{27}$; $\frac{9}{1} - \frac{8}{27} = \frac{243}{27} - \frac{8}{27}$
$= \frac{235}{27} = 8\frac{19}{27}$ Ans.

5. $\frac{3}{4} \times \frac{8\frac{4}{5}}{6\frac{2}{5}} \times \frac{4}{9} \times \frac{\frac{2}{7}}{16}$; $\frac{8\frac{4}{5}}{6\frac{2}{5}} = \frac{\frac{44}{5}}{\frac{32}{5}} = \frac{\overset{11}{\cancel{44}}}{\cancel{5}} \times \frac{\cancel{5}}{\underset{8}{\cancel{32}}} = \frac{11}{8}$; $\frac{\frac{2}{7}}{16} = \frac{\cancel{2}}{7} \times$
$\frac{1}{\underset{8}{\cancel{16}}} = \frac{1}{56}$; $\frac{\cancel{3}}{\cancel{4}} \times \frac{11}{8} \times \frac{\cancel{4}}{\underset{3}{\cancel{9}}} \times \frac{1}{56} = \frac{11}{1344}$ Ans

6. $\frac{3\frac{1}{2}}{5\frac{3}{4}} = \frac{7}{\cancel{2}} \times \frac{\overset{2}{\cancel{4}}}{23} = \frac{14}{23}$; $\frac{6\frac{1}{4}}{2\frac{4}{9}} = \frac{25}{4} \times \frac{9}{22} = \frac{225}{88}$; $\frac{225}{\underset{44}{\cancel{88}}} \times \frac{\overset{7}{\cancel{14}}}{23} =$
$\frac{1575}{1012} = 1\frac{563}{1012}$ Ans.

7. $\frac{\frac{7}{8}}{\frac{3}{11}} \times 12\frac{1}{2} = \frac{7}{8} \times \frac{11}{3} \times \frac{25}{2} = \frac{1925}{48}$; $\frac{\frac{1}{3}}{7\frac{1}{2}} \times 8\frac{3}{4} = \frac{1}{3} \times \frac{\cancel{2}}{\underset{3}{\cancel{15}}} \times$
$\frac{\overset{7}{\cancel{35}}}{\underset{2}{\cancel{4}}} = \frac{7}{18}$; $\frac{\overset{275}{\cancel{1925}}}{\underset{8}{\cancel{48}}} \times \frac{\overset{3}{\cancel{18}}}{\cancel{7}} = \frac{825}{8} = 103\frac{1}{8}$ Ans.

(ART. 167, p. 167.)

2. $\frac{3}{4}$, $\frac{5}{6}$, $1\frac{1}{8} = \frac{3}{4}$, $\frac{5}{6}$, $\frac{9}{8}$.

$$\begin{array}{l} \text{Greatest common divisor of} \\ \text{Least common multiple of} \end{array} \quad \frac{3,\ 5,\ 9}{4,\ 6,\ 8} = \frac{1}{24}\ \text{Ans.}$$

3.
$$\begin{array}{l} \text{Greatest common divisor of} \\ \text{Least common multiple of} \end{array} \quad \frac{12,\ 4,\ 8,\ 16}{13,\ 7,\ 21,\ 39} = \frac{4}{273}\ \text{Ans.}$$

4. $\frac{15}{16}, 2\frac{1}{4}, 4, 5\frac{1}{3} = \frac{15}{16}, \frac{9}{4}, \frac{4}{1}, \frac{16}{3}.$

$$\frac{\text{Greatest common divisor of } 15, 9, 4, 16 = 1}{\text{Least common multiple of } 16, 4, 1, 3 = 48} \quad \frac{1}{48} \text{ Ans.}$$

5. $166\frac{2}{3}, 156\frac{1}{4}, 208\frac{1}{3} = \frac{500}{3}, \frac{625}{4}, \frac{625}{3}.$

$$\frac{\text{Greatest common divisor of } 500, 625, 625 = 125}{\text{Least common multiple of } 3, 4, 3 = 12} \quad \frac{125}{12} = 10\frac{5}{12}$$

$10\frac{5}{12} + \frac{1}{2} = 10\frac{11}{12}$ feet. Ans.

## (Art. 168, p. 167.)

2. $$\frac{\text{Least common multiple of } 10, 6, 15 = 30}{\text{Greatest common divisor of } 28, 7, 35 = 7} \quad \frac{30}{7} = 4\frac{2}{7} \text{ Ans.}$$

3. $\frac{1}{15}, 2\frac{1}{2}, 5, 6\frac{1}{3}, \frac{1}{11} = \frac{1}{15}, \frac{5}{2}, \frac{5}{1}, \frac{19}{3}, \frac{1}{11}.$

$$\frac{\text{Least common multiple of } 1, 5, 5, 19, 1 = 95}{\text{Greatest common divisor of } 15, 2, 1, 3, 11 = 1} \quad \frac{95}{1} = 95 \text{ Ans}$$

4. $\frac{5}{16}, \frac{5}{8}, 1\frac{1}{2}, 2\frac{1}{4} = \frac{5}{16}, \frac{5}{8}, \frac{3}{2}, \frac{9}{4}.$

$$\frac{\text{Least common multiple of } 5, 5, 3, 9 = 45}{\text{Greatest common divisor of } 16, 8, 2, 4 = 2} \quad \frac{45}{2} = \$\,22\frac{1}{2} \text{ Ans.}$$

$\frac{45}{2} \div \frac{5}{16} = 72$ bushels of oats. $\frac{45}{2} \div \frac{5}{8} = 36$ bushels of corn.

$\frac{45}{2} \div \frac{3}{2} = 15$ bushels of rye. $\frac{45}{2} \div \frac{9}{4} = 10$ bushels of wheat.

5. $$\frac{\text{Least common multiple of } 3, 7 = 21}{\text{Greatest common divisor of } 4, 8 = 4} \quad \frac{21}{4} = 5\frac{1}{4} \text{ days.}$$

$10 \div \frac{3}{4} = \frac{40}{3}$; $\frac{40}{3} \times \frac{21}{4} = \frac{840}{12} = 70$ miles A.

$10 \div \frac{7}{8} = \frac{80}{7}$; $\frac{80}{7} \times \frac{21}{4} = \frac{1680}{28} = 60$ miles B.

## Miscellaneous Exercises in Vulgar Fractions.

## (Page 169.)

1. $76\frac{7}{25} = \frac{1907}{25}$; $18\frac{3}{4} = \frac{75}{4}$; $\frac{1907}{\cancel{25}} \times \frac{\overset{3}{\cancel{75}}}{4} = \frac{5721}{4} = 1430\frac{1}{4}$p

$= 8$A. $3$R. $30\frac{1}{4}$p. Ans.

2. $7\frac{3}{4} = \frac{31}{4}$; $1\frac{3}{4} = \frac{7}{4}$; $1\frac{1}{4} = \frac{5}{4}$; $\frac{31}{4} \times \frac{7}{4} \times \frac{5}{\underset{2}{\cancel{4}}} \times \frac{\overset{5}{\cancel{10}}}{1} = \frac{5425}{32} =$ $169\frac{17}{32}$ cubic feet, Ans.

3. $\frac{7}{11}$ of an acre = 2R. 21p. $222\frac{3}{4}$ft. From this we subtract 20p. 200ft.; and there remain 2R. 1p. $22\frac{3}{4}$ft. = 22075ft Ans.

4 $\frac{11}{13} \times \frac{160}{1} \times \frac{175}{1} = \frac{308000}{13} = \$236.92\frac{4}{13}$ Ans.

5. $15\frac{3}{4} = \frac{63}{4}$; $\frac{3}{19} \times \frac{\overset{5}{\cancel{20}}}{1} \times \frac{63}{\cancel{4}} = \frac{945}{19} = \$49.73\frac{13}{19}$.

6. $14\frac{2}{5} = \frac{72}{5}$; $11\frac{3}{7} = \frac{80}{7}$; $5\frac{4}{9} = \frac{49}{9}$; $10\frac{1}{4} = \frac{41}{4}$; $\frac{\overset{8}{\cancel{72}}}{\cancel{5}} \times \frac{\overset{4}{\cancel{80}}}{\cancel{7}} \times$ $\frac{\overset{7}{\cancel{49}}}{\cancel{9}} \times \frac{41}{\cancel{4}} = 9184$ Ans.

7. $\frac{7}{7} - \frac{4}{7} = \frac{3}{7}$; $\frac{7}{12} \times \frac{3}{7} = \frac{21}{84} = \frac{1}{4}$; $\frac{1}{4} \times \frac{100}{1} = 25$lb.; $\$0.12\frac{3}{4}$ $\times 25 = \$3.18\frac{3}{4}$ Ans.

8. $19\frac{3}{7} = \frac{136}{7}$; $7\frac{3}{8} = \frac{59}{8}$; $\frac{\overset{17}{\cancel{136}}}{7} \times \frac{59}{\cancel{8}} = \frac{1003}{7} = \$143\frac{2}{7}$ Ans.

9. $47\frac{5}{11} = \frac{522}{11}$; $29\frac{7}{16} = \frac{471}{16}$; $\frac{\overset{261}{\cancel{522}}}{11} \times \frac{471}{\underset{8}{\cancel{16}}} = \frac{122931}{88} = 1396\frac{83}{88}$ square rods; $5 \times 5 = 25$; $25 + 5 = 30$; $1396\frac{83}{88} - 30$ $= 1366\frac{83}{88}$ square rods, Ans.

10 $175\frac{3}{5} = \frac{878}{5}$; $\frac{5}{5} - \frac{3}{5} = \frac{2}{5}$; $\frac{878}{5} \times \frac{2}{5} = \frac{1756}{25}$; $\frac{3}{3} - \frac{2}{3} = \frac{1}{3}$. $\frac{1756}{25} \times \frac{1}{3} = \frac{1756}{75}$; $8\frac{3}{4} = \frac{35}{4}$; $\frac{\overset{439}{\cancel{1756}}}{\underset{15}{\cancel{75}}} \times \frac{\overset{7}{\cancel{35}}}{\cancel{4}} = \frac{3073}{15} =$ $\$2.04\frac{13}{15}$ Ans.

11. $475 \div 3 = 158\frac{1}{3}$; $158\frac{1}{3} \times .08 = \$12.66\frac{2}{3}$; $475 - 158\frac{1}{3} = 316\frac{2}{3}$; $\frac{2}{3} \times 316\frac{2}{3} = 211\frac{1}{9}$; $211\frac{1}{9} \times .10 = \$21.11\frac{1}{9}$; $316\frac{2}{3} - 211\frac{1}{9} = 105\frac{5}{9}$; $105\frac{5}{9} \times .12\frac{1}{2} = \$13.19\frac{4}{9}$ Ans $\$21.11\frac{1}{9} + \$12.66\frac{2}{3} + \$13.19\frac{4}{9} = \$46.97\frac{2}{9}$; $\$46.97\frac{2}{9} - \$30.00 = \$16.97\frac{2}{9}$, Green's bargain, Ans.

12. $14\frac{3}{7} = \frac{101}{7}$; $\frac{\overset{2}{\cancel{14}}}{\cancel{101}} \times \frac{\cancel{101}}{\cancel{7}} = \$2.00$ Ans.

13. $\frac{\cancel{7}}{\cancel{8}} \times \frac{\cancel{8}}{\cancel{11}} \times \frac{\cancel{11}}{\underset{2}{\cancel{14}}} = \frac{1}{2}$; $\frac{\cancel{5}}{\cancel{17}} \times \frac{\cancel{17}}{\cancel{19}} \times \frac{\cancel{19}}{\underset{5}{\cancel{25}}} = \frac{1}{5}$; $\frac{1}{2} \times \frac{1}{5} = \frac{1}{10}$ Ans

14. $11\frac{3}{4} = \frac{47}{4}$; $4\frac{1}{4} = \frac{17}{4}$; $\frac{47}{4} \times \frac{17}{4} = \frac{799}{16} = 49\frac{15}{16}$ sq. in. Ans.

15. $\$17.87\frac{1}{2} \div 2 = \$8.93\frac{3}{4}$. Now, if $\frac{3}{5}$ of this sum were given to the Bible Society, $\frac{2}{5}$ of it will remain; therefore, $\$8.93\frac{3}{4} \times \frac{2}{5} = \$3.57\frac{1}{2}$ Ans.

16. $10\frac{4}{5} = \frac{54}{5}$; $50 \times 5 = 250$; $250 \div 54 = 4\frac{17}{27}$; $12\frac{3}{4} - 4\frac{17}{27} = 8\frac{13}{108}$ Ans.

17. $7\frac{3}{8} = \frac{59}{8}$; $20 \times 8 = 160$; $160 \div 59 = 2\frac{42}{59}$ Ans.

18. $8\frac{5}{12} = \frac{101}{12}$; $3\frac{11}{12} = \frac{47}{12}$; $2\frac{1}{12} = \frac{25}{12}$; $\frac{101}{12} \times \frac{47}{12} \times \frac{25}{12} = \frac{118675}{1728} = 68\frac{1171}{1728}$ feet, Ans.

19. If $\frac{2}{3}$ of this field be planted with corn, $\frac{1}{3}$ of the field will remain unplanted. And, if $\frac{2}{3}$ of this remainder be sown with wheat, then there will remain $\frac{1}{9}$ of the whole field; because, if $\frac{2}{3}$ of $\frac{1}{3} = \frac{2}{9}$ be taken from $\frac{1}{3}$, the remainder will be $\frac{1}{9}$; thus, $\frac{1}{3} = \frac{3}{9} - \frac{2}{9} = \frac{1}{9}$. If, then, $\frac{3}{7}$ of this $\frac{1}{9}$ be planted with potatoes, $\frac{4}{7}$ of the $\frac{1}{9}$ will remain; and $\frac{4}{7}$ of $\frac{1}{9}$ is $\frac{4}{63}$. That is, the 3 rods square and the 3 square rods are $\frac{4}{63}$ of the whole field; but 3 rods square are 9 square rods; and if to these we add the 3 square rods, the whole amount will be 12 square rods. If, then, 12 square rods be $\frac{4}{63}$ of the field, 3 square rods will be $\frac{1}{13}$ of the field; and, if $\frac{1}{63}$ of the field be 3 rods, $\frac{63}{63}$, or the whole field, will be 63 times as much, that is, $63 \times 3 = 189$ square rods = 1A. 0R. 29p. Ans.

2. (Art. 169, p. 171.) $\frac{1}{\underset{\underset{35}{\cancel{70}}}{\cancel{1400}}} \times \frac{\cancel{20}}{1} \times \frac{12}{1} \times \frac{\overset{2}{\cancel{4}}}{1} = \frac{24}{35}$ Ans.

3. $\frac{4}{\underset{25}{\cancel{75}}} \times \frac{\overset{4}{\cancel{12}}}{1} = \frac{16}{25}$ Ans.

4. $\frac{1}{\underset{\underset{\underset{3}{\cancel{36}}}{\cancel{720}}}{\cancel{8640}}} \times \frac{\cancel{12}}{1} \times \frac{\cancel{20}}{1} \times \frac{\overset{2}{\cancel{24}}}{1} = \frac{2}{3}$ Ans.

5. $\frac{1}{\underset{\underset{27}{\cancel{432}}}{\cancel{1728}}} \times \frac{\cancel{4}}{1} \times \frac{25}{1} \times \frac{\cancel{16}}{1} = \frac{28}{27} = \frac{25}{27}$ Ans.

6. $\frac{1}{\underset{\underset{2}{\cancel{33}}}{\cancel{1320}}} \times \frac{\cancel{40}}{1} \times \frac{\cancel{16\frac{1}{2}}}{1} = \frac{1}{2}$ Ans.

7. $\frac{1}{\underset{363}{\cancel{58080}}} \times \frac{\cancel{160}}{1} \times \frac{272\frac{1}{4}}{1} = \frac{272\frac{1}{4}}{363} = \frac{1089}{1452} = \frac{3}{4}$ Ans.

8. $\frac{1}{\underset{\underset{28}{\cancel{11200}}}{\cancel{89600}}} \times \frac{\overset{3}{\cancel{24}}}{1} \times \frac{\overset{3}{\cancel{60}}}{1} \times \frac{\overset{3}{\cancel{60}}}{1} = \frac{27}{28}$ Ans.

9. $\frac{3}{\underset{7}{\cancel{14}}} \times \frac{\overset{2}{\cancel{4}}}{1} = \frac{6}{7}$ Ans.

10. $\frac{1}{\underset{\underset{2}{\cancel{50}}}{\cancel{200}}} \times \frac{\cancel{4}}{1} \times \frac{\cancel{25}}{1} = \frac{1}{2}$ Ans.

2. (ART. 170, p. 171.) $\frac{\cancel{4}}{7} \times \frac{1}{\underset{6}{\cancel{24}}} \times \frac{1}{20} \times \frac{1}{12} = \frac{1}{10080}$ Ans.

3. $\frac{\cancel{3}}{10} \times \frac{1}{\cancel{3}} \times \frac{1}{8} = \frac{1}{80}$ Ans.

4. $\frac{\cancel{4}}{5} \times \frac{1}{\underset{4}{\cancel{16}}} \times \frac{1}{25} \times \frac{1}{4} \times \frac{1}{20} = \frac{1}{40000}$ Ans.

5. $\frac{\cancel{8}}{9} \times \frac{1}{40} \times \frac{1}{\cancel{8}} = \frac{1}{360}$ Ans.

6. $\frac{\cancel{2}}{8} \times \frac{1}{272\frac{1}{4}} \times \frac{1}{40} \times \frac{1}{\underset{2}{\cancel{4}}} = \frac{1}{65340}$ Ans.

7. $\frac{\cancel{24}}{25} \times \frac{1}{60} \times \frac{1}{60} \times \frac{1}{\cancel{24}} = \frac{1}{90000}$ Ans.

8. $\frac{\cancel{4}}{9} \times \frac{1}{272\frac{1}{4}} \times \frac{1}{40} \times \frac{1}{\cancel{4}} \times \frac{1}{3} = \frac{1}{294030}$ Ans.

9. $\frac{\cancel{4}}{7} \times \frac{1}{\cancel{4}} \times \frac{1}{63} \times \frac{1}{3} = \frac{1}{1323}$ Ans.

10. A solid foot contains 1728 cubic inches, and $\frac{1}{6}$ of 1728 is 288. One sixth of a yard is 6 inches, and a cube whose sides measure 6 inches each contains $6 \times 6 \times 6 = 216$ cubic inches, and 216 is $\frac{3}{4}$ of 288; thus, $\frac{216}{288} = \frac{3}{4}$ Ans.

(ART. 171, p. 173.)

(2.)
7
4
9)28(3qr.
27
1
25
9)25(2lb.
18
7
16
9)112(12oz.
9
22
18
4
16
9)64(7$\frac{1}{9}$dr.
63
1

(3.)
7
4
9)28(3qr.
27
1
4
9)4(0$\frac{4}{9}$na.

(4.)
3
4
7)12(1R.
7
5
40
7)200(28p.
14
60
56
4
272$\frac{1}{4}$
1089
(Carried up.)

(Brought up.)
7)1089(155ft
7
38
35
39
35
4
144
7)576(82$\frac{2}{7}$in.
56
16
14
2

(5.)
2
8
9)16(1fur.
9
7
40
9)280(31rd.
27
10
9
1
16$\frac{1}{2}$
9)16$\frac{1}{2}$(1ft.
9
7$\frac{1}{2}$ (Carried up.)

(Brought up.)
7$\frac{1}{2}$
12
9)90(10in.
90

(6.)
3
5
11)15(1qr.
11
4
4
11)16(1$\frac{5}{11}$na.
11
5

(7.)
2
63
7)126(18gal.
7
56
56

(8.)

$$\begin{array}{r}
7\\
865\frac{1}{4}\\
\hline
11)2556\frac{3}{4}(232\text{d.}\\
22\phantom{00}\\
\hline
35\phantom{0}\\
33\phantom{0}\\
\hline
26\frac{3}{4}\\
22\phantom{\frac{3}{4}}\\
\hline
4\frac{3}{4}\\
24\phantom{\frac{3}{4}}\\
\hline
96\\
18\\
\hline
11)114(10\text{h.}\\
110\\
\hline
4\ \text{(Carried up.)}
\end{array}
\qquad
\begin{array}{r}
4\ \text{(Brought up.)}\\
60\\
\hline
11)240(21\text{m.}\\
22\phantom{0}\\
\hline
20\\
11\\
\hline
9\\
60\\
\hline
11)540(49\frac{1}{11}\text{s.}\\
44\phantom{0}\\
\hline
100\\
99\\
\hline
1
\end{array}$$

(Art. 172, p. 173.)

(2.)

$$\begin{matrix}4\text{s}\ 8\text{d.}\\ 1\pounds.\end{matrix}\ \frac{=56}{=240}=\frac{7}{30}\text{ Ans.}$$

(3.)

$$\begin{matrix}4\text{cwt. }3\text{qr. }12\text{lb.}\\ 1\text{T.}\end{matrix}\ \frac{=487}{=2000}\text{ Ans.}$$

(4.)

$$\begin{matrix}2\text{ fur. }30\text{rd.}\\ 2\text{m. }3\text{ fur. }20\text{rd.}\end{matrix}\ \frac{=110}{=780}=\frac{11}{78}\text{ Ans.}$$

(5.)

$$\begin{matrix}3\text{R. }24\text{p.}\\ 2\text{A. }2\text{R. }32\text{p.}\end{matrix}\ \frac{=144}{=432}=\frac{1}{3}\text{ Ans.}$$

(6.)

$$\begin{matrix}18\text{gal. }2\text{qt.}\\ 1\text{hhd.}\end{matrix}\ \frac{=74}{=252}=\frac{37}{126}\text{ Ans.}$$

(7.)

$$\begin{matrix}8\text{d. }17\text{h. }20\text{m.}\\ 30\text{d.}\end{matrix}\ \frac{=12560}{=43200}=\frac{157}{540}\text{ Ans.}$$

(8.)

$$\begin{matrix}5\text{yd. }2\text{qr. }2\text{na.}\\ 13\text{yd. }0\text{qr. }2\text{na.}\end{matrix}\ \frac{=90}{=210}=\frac{3}{7}\text{ Ans.}$$

(9.)

$$\begin{matrix}3\text{yd.}\\ 3\text{yd.}\times 3\end{matrix}\ \frac{=3}{=9}=\frac{1}{3}\text{ Ans.}$$

(Art. 173, p. 174.)

(2.)

| | s. | d. | far. |
|---|---|---|---|
| $\frac{4}{11}$£. = | 7 | 8 | $1\frac{1}{11}$ |
| $\frac{5}{7}$s. = | | 8 | $2\frac{2}{7}$ |
| Ans. | 7 | 11 | $3\frac{29}{77}$ |

(3.)

| | T. | cwt. | qr. | lb. |
|---|---|---|---|---|
| $\frac{10}{11}$T. = | | 18 | 0 | $18\frac{2}{11}$ |
| $\frac{7}{9}$ T. = | | 15 | 2 | $5\frac{5}{9}$ |
| $\frac{4}{7}$cwt. = | | | 2 | $7\frac{1}{7}$ |
| Ans. | 1 | 14 | 1 | $5\frac{610}{693}$ |

(4.)

| | yd. | qr. | na. | in. |
|---|---|---|---|---|
| $\frac{2}{3}$yd. = | | 2 | 2 | $1\frac{2}{3}$ |
| $\frac{8}{9}$yd. = | | 3 | 2 | $0\frac{1}{2}$ |
| $\frac{4}{11}$qr. = | | | 1 | $1\frac{1}{44}$ |
| Ans. | 1 | 2 | 2 | $0\frac{17}{22}$ |

(5.)

| | fur. | rd. | yd | ft. | in |
|---|---|---|---|---|---|
| $\frac{4}{11}$m. = | 2 | 36 | 2 | 0 | 0 |
| $\frac{4}{9}$m. = | 3 | 22 | 1 | 0 | 8 |
| $\frac{3}{11}$fur. = | | 10 | 5 | 0 | 0 |
| $\frac{7}{11}$yd. = | | | | 1 | $10\frac{10}{11}$ |
| | 6 | 29 | $2\frac{1}{2}$ | 2 | $6\frac{10}{11}$ |
| | | | $\frac{1}{2}$= | 1 | 6 |
| Ans. | 6 | 29 | 3 | 1 | $0\frac{10}{11}$ |

(6.)

| | A. | R. | p. | ft. | in. |
|---|---|---|---|---|---|
| $\frac{9}{11}$A. = | | 3 | 10 | 247 | 72 |
| $\frac{4}{5}$R. = | | | 32 | 0 | 0 |
| $\frac{5}{7}$p. = | | | 0 | 194 | $66\frac{6}{7}$ |
| | 1 | 0 | 3 | $168\frac{3}{4}$ | $138\frac{6}{7}$ |
| | | | | $\frac{3}{4}$= | 108 |
| Ans. | 1 | 0 | 3 | 169 | $102\frac{6}{7}$ |

(7.)

| | R. | p. | ft. |
|---|---|---|---|
| $\frac{4}{17}$A. = | 0 | 37 | $176\frac{1}{68}$ |
| $\frac{1}{7}$A. = | 0 | 22 | $233\frac{5}{14}$ |
| $\frac{2}{11}$A. = | 0 | 29 | $24\frac{3}{4}$ |
| $\frac{3}{7}$A. = | 1 | 28 | $155\frac{4}{7}$ |
| Ans. | 3 | 38 | $45\frac{81}{238}$ |

(Art. **174**, p. **175**.)

(2.)

| | cwt. | qr. | lb. |
|---|---|---|---|
| $\frac{4}{7}$T. = | 11 | 1 | $17\frac{6}{7}$ |
| $\frac{6}{17}$cwt. = | | 1 | $10\frac{5}{17}$ |
| Ans. | 11 | 0 | $7\frac{67}{119}$ |

(3.)

| | fur. | rd. | ft. | in. |
|---|---|---|---|---|
| $\frac{7}{9}$m. = | 6 | 8 | 14 | 8 |
| $\frac{7}{18}$fur. = | | 15 | 9 | 2 |
| Ans. | 5 | 33 | 5 | 6 |

(5.)

| | gal. | qt. | pt. |
|---|---|---|---|
| $\frac{3}{11}\times 100$gal. = | 27 | 1 | $0\frac{2}{11}$ |
| $\frac{11}{11}-\frac{3}{11}=\frac{8}{11}\times\frac{2}{3}=\frac{16}{33}\times 100$gal. = | 48 | 1 | $1\frac{29}{33}$ |
| | 75 | 3 | $0\frac{2}{33}$ |
| | 100 | 0 | 0 |
| | 75 | 3 | $0\frac{2}{33}$ |
| Ans. | 24 | 0 | $1\frac{31}{33}$ |

(4.)

| | R. | p | ft |
|---|---|---|---|
| $\frac{10}{17}$A. = | 3 | 25 | $123\frac{3}{4}$ |
| $\frac{2}{3}$B. = | | 8 | 242 |
| Ans. | 3 | 16 | 154 |

(6.)

| | m. | fur. | rd. | ft. | in. |
|---|---|---|---|---|---|
| 41m. × $\frac{3}{11}$ = | 11 | 1 | 18 | 3 | 0 |
| $\frac{11}{11} - \frac{3}{11} = \frac{8}{11} \times \frac{4}{7} = \frac{32}{77}$ × 41m. = | 17 | 0 | 12 | 7 | $8\frac{4}{7}$ |
| | 28 | 1 | 30 | 10 | $8\frac{4}{7}$ |
| | 41 | 0 | 0 | 0 | 0 |
| | 28 | 1 | 30 | 10 | $8\frac{4}{7}$ |
| Ans. | 12 | 6 | 9 | 5 | $9\frac{3}{7}$ |

(7.)

| | da. | h. | m. | s. |
|---|---|---|---|---|
| 365da. × $\frac{1}{7}$ = | 52 | 3 | 25 | $42\frac{6}{7}$ |
| $\frac{7}{7} - \frac{1}{7} = \frac{6}{7} \times \frac{3}{11} = \frac{18}{77}$ × 365da. = | 85 | 7 | 47 | $31\frac{73}{77}$ |
| Ans. | 137 | 11 | 13 | $14\frac{62}{77}$ |

(8.)

11A. 33p. $101\frac{1}{16}$ft. = $488245\frac{5}{16}$ft.;
$488245\frac{5}{16}$ft. × $\frac{2}{3}$ × $\frac{2}{5}$ = $130198\frac{3}{4}$ft.;
144 × 144 × 4 = 82944ft.;
$130198\frac{3}{4}$ — 82944 = $47254\frac{3}{4}$ft.;
$47254\frac{3}{4}$ × $.08\frac{1}{3}$ = $ $3937.89\frac{7}{12}$ Ans.

## QUESTIONS PERFORMED BY ANALYSIS.

2. (p. **176.**) $ 7.80 ÷ 10 = $ 0.78; $ 0.78 × 3 = $ 2.34 Ans
3. $ 17.84 ÷ 8 = $ 2.23; $ 2.23 × 7 = $ 15.61 Ans.
4. $ 786.63 ÷ 13 = $ 60.51; $ 60.51 × 11 = $ 665.61 Ans.
5. $ 87.50 ÷ 12 = $ $7.29\frac{1}{6}$; $ $7.29\frac{1}{6}$ × 11 = $ $80.20\frac{5}{6}$ Ans.
6. 17£. 18s. 9d. ÷ 4 = 4£. 9s. $8\frac{1}{4}$d.; 4£. 9s. $8\frac{1}{4}$d. × 3 = 13£ 9s. $0\frac{3}{4}$d. Ans.
7. 3T. 16cwt. 3qr. 23lb. ÷ 7 = 10cwt. 3qr. $24\frac{5}{7}$lb.; 10cwt. 3qr $24\frac{5}{7}$lb. × 4 = 2T. 3cwt. 3qr. $23\frac{6}{7}$lb Ans.

8. 27A. 3R. 33p. ÷ 9 = 3A. 0R. 17p.; 3A. 0R. 17p. × 4 = 12A. 1R. 28p. Ans.

10. $ 2.34 ÷ 3 = $ 0.78; $ 0.78 × 10 = $ 7.80 Ans.

11. $ 15.57$\frac{1}{2}$ ÷ 7 = $ 2.22$\frac{1}{2}$; $ 2.22$\frac{1}{2}$ × 8 = $ 17.80 Ans.

12. $ 665.50 ÷ 11 = $ 60.50; $ 60.50 × 13 = $ 786.50 Ans.

13. $ 73.60$\frac{5}{6}$ ÷ 11 = $ 6.69$\frac{1}{6}$; $ 6.69$\frac{1}{6}$ × 12 = $ 80.30 Ans.

14. 13£. 9s. 0$\frac{3}{4}$d. ÷ 3 = 4£. 9s. 8$\frac{1}{4}$d.; 4£. 9s. 8$\frac{1}{4}$d. × 4 = 17£. 18s. 9d. Ans.

15. 18cwt. 0qr. 12lb. ÷ 4 = 4cwt. 2qr. 3lb.; 4cwt. 2qr. 3lb. × 17 = 77cwt. 0qr. 1lb. Ans.

16. 12A. 1R. 30$\frac{7}{9}$p. ÷ 4 = 3A. 0R. 17$\frac{25}{36}$p.; 3A. 0R. 17$\frac{25}{36}$p. × 9 = 27A. 3R. 39$\frac{1}{4}$p. Ans.

17. $ 80.20$\frac{5}{6}$ ÷ 11 = $ 7.29$\frac{1}{6}$; $ 7.29$\frac{1}{6}$ × 12 = $ 87.50 Ans.

19. $ 2.52 ÷ 7 = $ 0.36; $ 0.36 × 11 = $ 3.96; $ 3.96 ÷ 9 = $ 0.44; $ 0.44 × 4 = $ 1.76 Ans.

20. $ 80.00 ÷ 3 = $ 26.66$\frac{2}{3}$; $ 26.66$\frac{2}{3}$ × 4 = $ 106.66$\frac{2}{3}$; $ 106.66$\frac{2}{3}$ ÷ 8 = $ 13.33$\frac{1}{3}$; $ 13.33$\frac{1}{3}$ × 7 = $ 93.33$\frac{1}{3}$ Ans.

21. $ 631.89 ÷ 9 = $ 70.21; $ 70.21 × 16 = $ 1123.36; $ 1123.36 ÷ 14 = $ 80.24; $ 80.24 × 5 = $ 401.20 Ans.

22. $ 141.52 ÷ 4 = $ 35.38; $ 35.38 × 5 = $ 176.90; $ 176.90 ÷ 29 = $ 6.10; $ 6.10 × 5 = $ 30.50 Ans.

23. $ 1728 ÷ 3 = $ 576; $ 576 × 8 = $ 4608; $\frac{8}{8} - \frac{3}{8} = \frac{5}{8}$, $\frac{\cancel{5}}{\underset{2}{\cancel{8}}} \times \frac{\cancel{4}}{\cancel{5}} = \frac{1}{2}$; $ 4608 × $\frac{1}{2}$ = $ 2304 Ans.

24. $ 82.80 ÷ 4 = $ 20.70; $ 20.70 × 7 = $ 144.90; $\frac{7}{7} - \frac{4}{7} = \frac{3}{7}$; $\frac{\cancel{3}}{7} \times \frac{2}{\cancel{3}} = \frac{2}{7}$; $ 144.90 ÷ 7 = $ 20.70; $ 20.70 × 2 = $ 41.40 Ans.

25. 26£. 12s. 6d. ÷ 5 = 5£. 6s. 6d.; 5£. 6s. 6d. × 9 = 47£. 18s. 6d.; $\frac{9}{9} - \frac{5}{9} = \frac{4}{9}$; $\frac{\cancel{4}}{9} \times \frac{7}{\underset{2}{\cancel{8}}} = \frac{7}{18}$; 47£. 18s. 6d. ÷ 18 = 2£. 13s. 3d.; 2£. 13s. 3d. × 7 = 18£. 12s. 9d. Ans.

27. \$ 49.00 ÷ 3 = \$ $16.33\frac{1}{3}$ ; \$ $16.33\frac{1}{3}$ ÷ 11 = \$ $1.48\frac{16}{33}$
\$ $1.48\frac{16}{33}$ × 81 = \$ $120.27\frac{3}{11}$ Ans.

28. \$ 78.80 ÷ 11 = \$ $7.16\frac{4}{11}$ ; \$ $7.16\frac{4}{11}$ ÷ 9 = \$ $0.79\frac{59}{99}$
\$ $0.79\frac{59}{99}$ × 31 = \$ $24.67\frac{47}{99}$ Ans.

29. 37£. 18s. 10d. ÷ 3 = 12£. 12s. $11\frac{1}{3}$d. ; 12£. 12s. $11\frac{1}{3}$d. ÷ 8 = 1£. 11s. $7\frac{5}{12}$d. ; 1£. 11s. $7\frac{5}{12}$d. × 43 = 67£. 19s. $6\frac{11}{12}$d. Ans.

30. \$ 40 ÷ 5 = \$ 8.00 ; \$ 8.00 ÷ 7 = \$ $1.14\frac{2}{7}$ ; \$ $1.14\frac{2}{7}$ × 137 = \$ $156.57\frac{1}{7}$ Ans.

31. \$ 360 ÷ 20 = \$ 18 ; \$ 18 ÷ 6 = \$ 3 ; \$ 3 × 263 = \$ 789 Ans.

32. \$ 8.75 ÷ 7 = \$ 1.25 ; \$ 1.25 ÷ 11 = \$ $0.11\frac{4}{11}$ ; \$ $0.11\frac{4}{11}$ × 205 = \$ $23.29\frac{6}{11}$ Ans.

33. \$ 19.80 ÷ 3 = \$ 6.60 ; \$ 6.60 ÷ 7 = \$ $0.94\frac{2}{7}$ ; \$ $0.94\frac{2}{7}$ × 81 = \$ $76.37\frac{1}{7}$ Ans.

35. 3cwt. ÷ 151 = $\frac{3}{151}$ ; $\frac{3}{151} \times \frac{8}{1} = \frac{24}{151}$ ; $\frac{24}{151} \times \frac{78}{1} = \frac{1872}{151}$ = $12\frac{60}{151}$cwt. Ans.

36. \$ 276.18 ÷ 24 = \$ $11.50\frac{3}{4}$ ; \$ $11.50\frac{3}{4}$ × 7 = \$ $80.55\frac{1}{4}$ ;
\$ $80.55\frac{1}{4}$ × 75 = \$ $6041.43\frac{3}{4}$ Ans.

37. \$ 875.00 ÷ 81 = \$ $10.80\frac{20}{81}$ ; \$ $10.80\frac{20}{81}$ × 11 = \$ $118.82\frac{58}{81}$ ; \$ $118.82\frac{58}{81}$ × 75 = \$ $8912.03\frac{19}{27}$ Ans.

38. \$ 70 ÷ 35 = \$ 2 ; \$ 2 × 8 = \$ 16 ; \$ 16 × 86 = \$ 1376 Ans.

39. \$ 375.00 ÷ 111 = \$ $3.37\frac{93}{111}$ ; \$ $3.37\frac{93}{111}$ × 4 = \$ $13.51\frac{39}{111}$ ;
\$ $13.51\frac{39}{111}$ × 69 = \$ $932.43\frac{9}{37}$ Ans.

40. \$ 80.50 ÷ 23 = \$ 3.50 ; \$ 3.50 × 5 = \$ 17.50 ; \$ 17.50 × 15 = \$ 262.50 Ans.

41. \$ 62.37 ÷ 81 = \$ 0.77 ; \$ 0.77 × 11 = \$ 8.47 ; \$ 8.47 × 19 = \$ 160.93 Ans.

43. \$ 668.50 ÷ 191 = \$ 3.50 ; \$ 3.50 × 11 = \$38.50 ; \$38.50 ÷ 5 = \$ 7.70 ; \$ 7.70 × 449 = \$ 3457.30 Ans.

44. \$ 1738 ÷ 79 = \$ 22 ; \$ 22 × 4 = \$ 88 ; \$ 88 ÷ 11 = \$ 8 ; \$ 8 × 411 = \$ 3288 Ans.

45. 1128ft. ÷ 47 = 24 ; 24 × 4 = 96 ; 96 ÷ 8 = 12 ; 8 × 1435 = 11480 feet, Ans.

46. 116cwt $\div 29 = 4$; $4 \times 8 = 32$; $32 \div 4 = 8$, $8 \times 47 =$ 376cwt. Ans.

47. $376 \div 47 = 8$; $8 \times 4 = 32$; $32 \div 8 = 4$; $4 \times 29 =$ 116cwt. Ans.

48. $\$\,8 \div 10 = \frac{4}{5}$; $\frac{4}{5} \times \frac{7}{1} = \frac{28}{5}$; $\frac{\overset{7}{\cancel{28}}}{5} \times \frac{1}{\cancel{4}} = \frac{7}{5}$; $\frac{7}{\cancel{5}} \times \frac{\overset{7}{\cancel{35}}}{1} =$ \$ 49 Ans.

49. $\$\,414 \div 207 = \$\,2$; $\$\,2 \times 10 = \$\,20$; $\$\,20 \div 5 = \$\,4$; $\$\,4 \times 59 = \$\,236$ Ans.

MISCELLANEOUS QUESTIONS BY ANALYSIS.

1. (P. **179.**) $\$\,896.50 \div 11 = \$\,81.50$; $\$\,81.50 \times 10 =$ \$ 815 Ans.

2. $\$\,17\frac{3}{11} \div 3 = \$\,5\frac{25}{33}$; $\$\,5\frac{25}{33} \times 37 = \$\,213.03\frac{1}{33}$ Ans.

3. $\$\,3687 \div 8 = \$\,460.87\frac{1}{2}$; $\$\,460.87\frac{1}{2} \times 7 = \$\,3226.12\frac{1}{2}$ Ans.

4. $17\frac{7}{12} = \frac{211}{12}$; $187\frac{3}{8} = \frac{1499}{8}$; $\frac{1499}{8} \div \frac{211}{12} = \frac{1499}{\underset{2}{\cancel{8}}} \times \frac{\overset{3}{\cancel{12}}}{211}$ $= \frac{4497}{422}$; $\frac{4497}{422} \times \frac{5}{7} = \frac{22485}{2954} = \$\,7.61\frac{253}{1477}$ Ans.

5. $\$\,13\frac{7}{8} = \frac{111}{8}$; $\frac{111}{8} \times \frac{11}{5} = \frac{1221}{40} = \$\,30.52\frac{1}{2}$ Ans.

6. $\$\,37\frac{3}{11} = \frac{410}{11}$; $\frac{410}{11} \div 100 = \frac{41}{110}$; $\frac{41}{110} \times \frac{4}{7} = \frac{164}{770} =$ \$ $0.21\frac{23}{77}$ Ans.

7. $\$\,0.12 \times \frac{11}{4} = \frac{132}{4}$; $48\frac{7}{13} = \frac{631}{13}$; $\frac{\overset{33}{\cancel{132}}}{\cancel{4}} \times \frac{631}{13} = \frac{20823}{13}$ $= \$16.01\frac{10}{13}$ Ans.

8. $\$\,3\frac{2}{7} = \frac{23}{7}$; $6\frac{3}{5} = \frac{33}{5}$; $\frac{23}{7} \times \frac{9}{4} = \frac{207}{28}$; $\frac{207}{28} \times \frac{33}{5} = \frac{6831}{140}$ $= \$\,48\frac{111}{140}$ Ans.

9. $\$\,236 \div 11\frac{4}{5} = \frac{\overset{4}{\cancel{236}}}{1} \times \frac{5}{\cancel{59}} = \$\,20$; $\$\,20 \times 20\frac{7}{10} = \$\,414$ [Ans.

10. $97\frac{4}{7} \div 3 = 32\frac{11}{21}$; $1073\frac{2}{7} \div 32\frac{11}{21} = \frac{\overset{11}{\cancel{7513}}}{\cancel{7}} \times \frac{\overset{3}{\cancel{21}}}{\cancel{683}} = 33$ bales. Ans.

11 $\$\,48\frac{111}{140} \div 6\frac{3}{5} = \frac{6831}{140} \div \frac{33}{5} = \frac{\overset{207}{\cancel{6831}}}{\underset{28}{\cancel{140}}} \times \frac{\cancel{5}}{\cancel{33}} = \frac{207}{28}$; $\frac{\overset{23}{\cancel{207}}}{\underset{7}{\cancel{28}}} \times \frac{\cancel{4}}{\cancel{9}} = \frac{23}{7} = \$\,3.28\frac{4}{7}$ Ans.

12. $34 \div 3\frac{2}{3} = \frac{34}{1} \times \frac{3}{11} = \frac{102}{11}$; $\frac{102}{11} \times 74\frac{1}{2} = \frac{\overset{51}{\cancel{102}}}{11} \times \frac{149}{\cancel{2}} = \frac{7599}{11} = \$\,6.90\frac{9}{11}$ Ans.

13. $\$\,63 \div 2\frac{5}{7} = 63 \div \frac{19}{7} = \frac{63}{1} \times \frac{7}{19} = \frac{441}{19}$; $\frac{\overset{49}{\cancel{441}}}{19} \times \frac{148}{\cancel{9}} = \frac{7252}{19} = \$\,381\frac{13}{19}$ Ans.

14. $\$\,17\frac{4}{11} \div (3 \times 3) = \$\,17\frac{4}{11} \div 9 = \$\,1\frac{92}{99}$; $\$\,1\frac{92}{99} \times 4 = \$\,7\frac{71}{99}$ Ans.

15. $\$\,31\frac{4}{7} = \frac{221}{7}$; $2\frac{5}{6} = \frac{17}{6}$; $\frac{221}{7} \div \frac{17}{6} = \frac{\overset{13}{\cancel{221}}}{7} \times \frac{6}{\cancel{17}} = \frac{78}{7}$;

$689\frac{4}{13} = \frac{8961}{13}$; $\frac{\overset{6}{\cancel{78}}}{7} \times \frac{8961}{\cancel{13}} = \frac{53766}{7} = \$\,7680\frac{6}{7}$ Ans.

16. $\$\,63 \div 6\frac{2}{3} = \frac{63}{1} \div \frac{20}{3} = \frac{63}{1} \times \frac{3}{20} = \frac{189}{20}$; $\frac{189}{\underset{10}{\cancel{20}}} \times \frac{\overset{9}{\cancel{18}}}{1} = \frac{1701}{10} = \$\,170.10$ Ans.

17. $\$\,243\frac{1}{11} = \frac{2674}{11}$; $\frac{96}{1} \div \frac{2674}{11} = \frac{\overset{48}{\cancel{96}}}{1} \times \frac{11}{\underset{1337}{\cancel{2674}}} = \frac{528}{1337}$; $\$\,1000 \times \frac{528}{1337} = 394\frac{1222}{1337}$ barrels, Ans.

18. $83\frac{9}{16} = \frac{1337}{16}$; $\$\,7888.30 \div \frac{1337}{16} = \frac{\overset{590}{\cancel{788830}}}{1} \times \frac{16}{\cancel{1337}} = \$\,94.40$; $\$\,94.40 \times 7 = \$\,660.80$ Ans.

19. 132£. 12s. = 2652s.; $7\frac{5}{9} = \frac{68}{9} \cdot 12\frac{7}{9} = \frac{115}{9}$; 2652s. $\div \frac{68}{9} = \frac{\overset{39}{\cancel{2652}}}{1} \times \frac{9}{\cancel{68}} =$ 351s.; $\frac{\overset{39}{\cancel{351}}}{1} \times \frac{115}{\cancel{9}} =$ 4485s. = 224£. 5s. Ans.

20. $17\frac{2}{3} = \frac{53}{3}$; $89\frac{1}{3} = \frac{268}{3}$; $\$\,25.44 \div \frac{53}{3} = \frac{\overset{48}{\cancel{2544}}}{1} \times \frac{3}{\cancel{53}} =$ $\$\,144$; $\frac{\overset{48}{\cancel{144}}}{1} \times \frac{268}{\cancel{3}} = \$\,128.64$ Ans.

21. $7\frac{7}{12} = \frac{91}{12}$; $19\frac{11}{12} = \frac{239}{12}$; $\$\,7.28 \div \frac{91}{12} = \frac{\overset{8}{\cancel{728}}}{1} \times \frac{12}{\cancel{91}} =$ $\$\,0.96$; $\$\,0.96 \times \frac{239}{12} = \$\,19.12$ Ans.

22. $49\frac{6}{7} = \frac{349}{7}$; $37\frac{5}{7} = \frac{264}{7}$; $\$\,4355.52 \div \frac{349}{7} = \frac{\overset{1248}{\cancel{435552}}}{1} \times \frac{7}{\cancel{349}} = \$\,87.36$; $\frac{\overset{1248}{\cancel{8736}}}{1} \times \frac{264}{\cancel{7}} = \$\,3294.72$ Ans.

23. $\frac{1}{4} \times \frac{3}{5} = \frac{3}{20}$; $\$\,300,000 \div 3 = \$\,100,000$; $\$\,100,000 \times 20 = \$\,2,000,000$ Ans.

24. $7\frac{6}{13} = \frac{97}{13}$; $19\frac{3}{4} = \frac{79}{4}$; $\$\,135.80 \div \frac{97}{13} = \frac{\overset{140}{\cancel{13580}}}{1} \times \frac{13}{\cancel{97}} =$ $\$\,18.20$; $\frac{\overset{455}{\cancel{1820}}}{1} \times \frac{79}{\cancel{4}} = \$\,359.45$ Ans.

25. 6 cords 76ft. = 844ft.; $\frac{7}{7} - \frac{3}{7} = \frac{4}{7}$; $4\frac{4}{5} = \frac{24}{5}$; 844ft. $\times \frac{4}{7} = \frac{844}{1} \times \frac{4}{7} = \frac{3376}{7}$; $\frac{3376}{7} \times \frac{24}{5} = \frac{81024}{35} =$ $\$\,23.14\frac{34}{35}$ Ans.

26. 30rd. × 30rd. = 900; $18 + 82 = 100$; $900 - 100 = 800$; $\frac{800}{900} = \frac{8}{9}$ Ans.

27. 7T. 12cwt. 3qr. 18lb. — 3T. 18cwt. 1qr. 20lb. = 3T. 14cwt. 1qr. 23lb. = 7448lb.; 7448lb. $\times \frac{3}{5} = 4468\frac{4}{5}$lb.; $4468\frac{4}{5}$lb. $\times \$\,0.05\frac{3}{7} = \$\,242.59\frac{1}{5}$ Ans.

28. $\$\,68.50 \times 37 = \$\,2534.50$; $\$\,2534.50 \times \frac{3}{4} = \$\,1900.87\frac{1}{2}$ = value of coffee; $\$\,2534.50 - \$\,1900.87\frac{1}{2} =$ $\$\,633.62\frac{1}{2}$ Ans.

29. $\frac{4}{4} - \frac{3}{4} = \frac{1}{4}$; $\$\,7896 \times \frac{1}{4} = \$\,1974$; $\$\,1974 \times 2 =$ $\$\,3948$ Ans.

30. $\frac{13}{13}-\frac{4}{13}=\frac{9}{13}$; $\frac{9}{13}\times\frac{5}{13}=\frac{45}{169}$; $\frac{9}{13}-\frac{45}{169}=\frac{72}{169}$; \$ 88 $\times\frac{72}{169}=\frac{8800}{1}\times\frac{72}{169}=\frac{633600}{169}=$ \$ 37.49$\frac{19}{169}$ Ans.

31. $\frac{4}{4}-\frac{3}{4}=\frac{1}{4}$; $\frac{1}{\underset{2}{\cancel{4}}}\times\frac{\overset{1}{\cancel{2}}}{3}=\frac{1}{6}$; $\frac{1}{4}-\frac{1}{6}=\frac{1}{12}$; $\frac{1}{\underset{4}{\cancel{12}}}\times\frac{\cancel{3}}{4}=\frac{1}{16}=$ \$ 750; $\frac{16}{16}=$ \$ 750 × 16 = \$ 12,000 Ans.

32. 1A. = 43560ft.; 100 × 100 × 20000ft. 43560ft. − 20000ft. 23560ft.; 23560ft. × 8 = \$ 1884.80 Ans.

## DECIMAL FRACTIONS.

### Notation of Decimal Fractions.

(Art. 181, p. 183.)

| | | | |
|---|---|---|---|
| 1. | 307.25 | 7. | 75.9 |
| 2. | 47.7 | 8. | 2000.002 |
| 3. | 18.05 | 9. | 18.018 |
| 4. | 29.003 | 10. | 505.001006 |
| 5. | .0049 | 11. | 300.0000042 |
| 6. | 8.000008 | 12. | 2500.000000037 |
| | | | or 2500.000000000037 |

### Addition of Decimals.

(Art. 183, p. 184.)

| (2.) | (3.) | (4.) |
|---|---|---|
| 171.61111 | .16711 | 151.01 |
| 16.7101 | 1.766 | 611111.01 |
| .00007 | 76111.1 | 16.5 |
| 71.0006 | 167.1 | 6.7 |
| 1.167895 | .000007 | 46.1 |
| 260.489775 | 1476.1 | .67896 |
| | 77756.233117 | 611331.99896 |

| (5.) | (6.) | (7.) |
|---|---|---|
| 56000.014 | 49.0105 | 3.0018 |
| 19.19 | 89.107 | 1005.023043 |
| 57.0048 | .000127 | 87.107 |
| 23005.4 | .0048 | .0049 |
| .000014 | 138.122427 | 47000.00309 |
| 79081.608814 | | 48095.139833 |

## Subtraction of Decimals.

(Art. 184, p. 185.)

| (6.) | (7.) | (8.) | (9.) | (10.) |
|---|---|---|---|---|
| 81.35 | 1. | 100. | 87.1 | 100. |
| 11.678956 | .876543 | 99.111176 | 5.6789 | .001 |
| 69.671044 | .123457 | .888824 | 81.4211 | 99.999 |

| (11.) | (12.) | (13.) | (14.) | (15.) |
|---|---|---|---|---|
| 73. | 365. | 357000. | .875 | .3125 |
| .073 | .0047 | 28.0004009 | .4 | .125 |
| 72.927 | 364.9953 | 356971.9995991 | .475 | .1875 |

| (16.) | (17.) | (18.) | (19.) | (20.) |
|---|---|---|---|---|
| .95 | 3.7 | 8.125 | 9.375 | .666 |
| .44 | 1.8 | 2.6875 | 1.5 | .041 |
| .51 | 1.9 | 5.4375 | 7.875 | .625 |

## Multiplication of Decimals.

(Art. 185, p. 187.)

3. .12649
4. 18.58922
5. .00000114
6. 1137.
7. 2.20947
8. .00046967
9. 22.09

| (10.) | (11.) | (12.) | (13.) |
|---|---|---|---|
| .087 | 107000.0015 | .0097 | .096 |
| .000015 | .0107 | 400.67 | .00096 |
| 000001305 | 7490000105 | 679 | 576 |
| | 1070000015 | 582 | 864 |
| | 1144.90001605 | 388 | .00009216 |
| | | 3.886499 | |

(14.)
1000000.
.000001
1.000000

(15.)
100.
.0014
400
100
.14

(16.)
.101
.10101
101
101
101
.01020201

(17.)
1050.0007
.00305
52500035
31500021
3.202502135

(18.)
2000000.
.7
1400000.0

(19.)
400.004
30.03
1200012
1200012
2012.12012

(20.)
$ 1.125
46.
6750
4500
$ 51.75

(21.)
17.125
18.875
85625
119875
137000
137000
17125
$ 323.234375

(22.)
$ .125
18.
1000
125
$ 2.250

(23.)
375025
0.62
75050
225150
$ 232.6550

## DIVISION OF DECIMALS.

3. (ART. **186**, p. **189**.) .375
4. 2.069
5. 1930.51
6. .069255
7. .01728
8. 9.784
9. 125.36
10. 148.939+

(11.)
1.2)172.8(144.

(12.)
.12)1728.00(14400.

(13.)
.12).1728(1.44

(14.)
12)1.728(.144

(15.)
1.2)17.28(14.4

(16.)
.0012)1728.0000(1440000.

(17.)
12).001728(.000144

(18.)
1000)116.31(.11631

(19.)
9.7)147.828(15.24

(20.)
5.42801)75.16000(13.846+

(21.)
.328).678767(2.069+

## REDUCTION OF DECIMALS.

### (ART. 187, p. 190.)

(2.)
4)3.00
.75

(3.)
8)7.000
.875

(4.)
16)7.0000
.4375

(5.)
17)4.000000
.235294+

(6.)
11)4.000000
.363636+

(7.)
12)5.000000
.416666+

(8.) $.875 = \frac{875}{1000} = \frac{7}{8}$ Ans.

(9.) $.4375 = \frac{4375}{10000} = \frac{7}{16}$ Ans.

(10.) $.\dot{7}\dot{2} = \frac{72}{99} = \frac{24}{33} = \frac{8}{11}$ Ans.

(11.) $.\dot{1}3\dot{5} = \frac{135}{999} = \frac{45}{333} = \frac{5}{37}$ Ans.

(12.) $.235\dot{6}\dot{2} = \frac{235\frac{62}{99}}{1000} = \frac{23327}{99000}$ Ans.

(13.) $.09\dot{3} = \frac{9\frac{3}{9}}{100} = \frac{84}{900} = \frac{7}{75}$ Ans.

### (ART. 188, p. 191.)

(2.)

$$\begin{array}{r|l} 12 & 6.0 \\ 20 & 15.5 \\ \hline & .775 \end{array}$$

(3.)

$$\begin{array}{r|l} 25 & 14. \\ 4 & 2.56 \\ 20 & 5.64 \\ \hline & .282 \end{array}$$

(4.)

$$\begin{array}{r|l} 25 & 21.00 \\ 4 & 3.84 \\ \hline & .96 \end{array}$$

(5.)

$$\begin{array}{r|l} 40 & 8.0 \\ 8 & 6.200 \\ \hline & .775 \end{array}$$

(6.)

$$\begin{array}{r|l} 144 & 72.0 \\ 272\frac{1}{4} & 167.5 \\ 40 & 19.615243 \\ 4 & 3.490381 \\ \hline & .872595+ \end{array}$$

### (Art. 189, p. 192.)

(2.)

$$\begin{array}{r} .628125 \\ 20 \\ \hline 12.562500 \\ 12 \\ \hline 6.750000 \\ 4 \\ \hline 3.000000 \end{array}$$

Ans. 12s. 6$\frac{3}{4}$d.

(3.)

$$\begin{array}{r} .778125 \\ 20 \\ \hline 15.562500 \\ 4 \\ \hline 2.250000 \\ 25 \\ \hline 6.250000 \\ 16 \\ \hline 4.000000 \end{array}$$

Ans. 15cwt. 2qr. 6lb. 4oz.

(4.)

$$\begin{array}{r} .75 \\ 5 \\ \hline 3.75 \\ 4 \\ \hline 3.00 \end{array}$$

Ans. 3qr. 3na.

(5.)

$$\begin{array}{r} .965625 \\ 8 \\ \hline 7.725000 \\ 40 \\ \hline 29.000000 \end{array}$$

Ans. 7fur. 29rd.

(6.)

$$\begin{array}{r} .94375 \\ 4 \\ \hline 3.77500 \\ 40 \\ \hline 31.00000 \end{array}$$

Ans. 3R. 31p.

(7.)

$$\begin{array}{r} .185625 \\ 12 \\ \hline 9.787500 \\ 20 \\ \hline 15.750000 \\ 24 \\ \hline 18.000000 \end{array}$$

Ans. 9oz. 15pwt. 18gr.

(8.)

$$\begin{array}{r} .5555 \\ 12 \\ \hline 6.6660 \\ 8 \\ \hline 5.3280 \\ 3 \\ \hline .9840 \\ 20 \\ \hline 19.6800 \end{array}$$

Ans. 6℥ 5ʒ 0℈ 19$\frac{17}{25}$gr.

### EXERCISES IN DECIMALS.

(1.)

$$\begin{array}{r|r} 25 & 14. \\ 4 & 3.56 \\ \hline & 15.89 \\ & 9.50 \\ \hline & 79450 \\ & 14301\phantom{0} \\ \hline & \$\,150.95\,50 \end{array}$$

(2.)

$$\begin{array}{r|r} 25 & 7. \\ 4 & 1.28 \\ 20 & 18.32 \\ \hline & 17.916 \\ & 53.80 \\ \hline & 1433280 \\ & 53748\phantom{0} \\ & 89580\phantom{00} \\ \hline & \$\,963.88\,080 \end{array}$$

3. 16÷40=.4; 3+.4=3.4; 3.4÷4=.85; 37+.85=37.85; 37.85 × 75.16 = $ 2844.806 Ans.
4. 2÷4=.5; 3+.5=3.5; 3.5÷4=.875; 15+.875=15.875 15.875 × 3.75 = $ 59.53125 Ans.
5. 15.375 × 4.625 = $ 71.109375 Ans.
6. 36÷40=.9; 6+.9=6.9; 6.9÷8=.8625; 17+.8625= 17.8625; 17.8625 × 3765.60=$ 67263.03 Ans.
7. 21 ÷ 63=.333+; 27+.333+ =27.333+; 27.333+ × $ 15.375=$ 420.24 4875+ Ans.
8. 9÷12=.75; 18+.75=18.75; 6÷12=.5; 4+.5=4.5; 3 ÷ 12 =.25; 7 +.25 = 7.25; 18.75 × 4.5 × 7.25 = 611.71875ft.; .71875 × 1728 = 1242in. Ans. 611ft. 1242in.
9. 6÷12=.5; 12+.5=12.5; 9÷12=.75; 2+.75=2.75; 12.5×2.75=34.375ft.; .375×144=54in. Ans. 34ft. 54in.
10. 1÷2=.5; 3+.5=3.5; 3.5÷4=.875; 25+.875=25.875; 25.875 × .375 = $ 9.703125 Ans.
11. 30÷40=.75; 3+.75=3.75; 3.75÷4 =.9375; 144+ .9375 = 144.9375; 144.9375 × 97.625 = 14149.52-34375 Ans.
12. 21÷25=.84; .84÷4=.21; 18+.21=18.21; 18.21÷20 = .9105, 3 + .9105 = 3.9105; 3.9105 × 9.375 = $ 36.6609375; $ 36.6609375 — $ 20.25 = $ 16.4109 *375 Ans.*

13. \$ 5.50÷7=\$ $.78\frac{4}{7}$; \$ $.78\frac{4}{7}\times 8$=\$ $6.28\frac{4}{7}$; \$ $6.28\frac{4}{7}\times 7.75$= \$ $48.7142\frac{6}{7}$ Ans.

14. \$ $12\frac{5}{8}$ = \$ 12.625 ; $4\frac{3}{4} = 4.75$ ; \$ 12.625 ÷ 4.75 = 2.657894+ ; 2.657894+×17.375=\$ 46.18,09+ Ans.

15. $\frac{4}{4}-\frac{1}{4}=\frac{3}{4}$; $\frac{3}{4}\times\frac{1}{3}=\frac{3}{12}=\frac{1}{4}$; $\frac{1}{4}+\frac{1}{4}=\frac{1}{2}$; \$ 17500 × $\frac{1}{2}$= \$ 87500; \$ 87500+\$ 500=\$18000; \$ 9000+\$ 9200+ \$ 18000=\$ 36200; \$ 36200—\$ 18000=\$ 1200 Ans.

---

## PERCENTAGE.

| | | | |
|---|---|---|---|
| 2. | (**Art. 191, p. 195.**) \$ 6.50 | 6. | \$ 490 |
| 3. | \$ 39.45 | 7. | \$ 15.12 |
| 4. | \$ 51.38 9 | 8. | 26.415 yards |
| 5. | 57.375 tons. | 9. | \$ 877.50 |

10. 5000 × 1.25=\$ 6250; \$ 5000×.25=1250; 5000—1250 =3750; 3750 × 2=\$ 7500; \$ 7500—\$ 6250=\$ 1250 Ans.

11. \$ 8000×.19=\$ 1520; \$ 8000—\$ 1520=\$ 6480; \$ 6480× .37 = \$ 2397.60; \$ 6480.00—\$ 2397.60 = \$ 4082.40; \$ 4082.40—\$ 2000=\$ 2082.40 Ans.

(12.)

$1\frac{3}{4} = 1.75$

$1.75 \times .95 = 1.6625$

$10 \div 1.6625 = 6\frac{2}{133} = \frac{800}{133}$

$\frac{800}{133} \times \frac{100}{95} = \frac{80000}{12635}$

$$\begin{array}{r} 12635)80000(6\text{yd.} \\ \underline{75810} \\ 4190 \\ \underline{4} \\ 12635)16760(1\text{qr.} \\ \underline{12635} \\ 4125 \\ \underline{4} \\ 12635)16500(1\frac{773}{2527}\text{na} \\ \underline{12635} \\ 3865 \end{array}$$

Ans. 6yd. 1qr. $1\frac{773}{2527}$na.

13. \$ 10,000×.15=\$ 1500; \$ 10,000—\$ 1500=\$ 8500 Ans

## SIMPLE INTEREST.

| | | | |
|---|---|---|---|
| | (Art. 193, p. 198.) | 6. | $ 0.42 2⅓ |
| 2. | $ 0.08 1 | 7. | $ 0.01 9⅔ |
| 3. | $ 0.10 7 | 8. | $ 0.25 0⅚ |
| 4. | $ 0.22 3⅙ | 9. | $ 0.02 0⅓ |
| 5. | $ 0.12 8⅓ | | |

| | | | |
|---|---|---|---|
| | (Art. 194, p. 199.) | 11. | $ 88.89 9 |
| 2. | $ 11.82 | 12. | $ 122.71 5 |
| 3. | $ 311.04 | 13. | $ 1.24 8 |
| 4. | $ 8.28 | 14. | $ 0.20 5 |
| 5. | $ 155.52 | 15. | $ 50.01 6 |
| 6. | $ 1.68 7 | 16. | $ 0.03 1 |
| 7. | $ 17.72 2 | 17. | $ 55.60 7 |
| 8. | $ 8.25 8 | 18. | $ 149.77 6 |
| 9. | $ 90.83 5 | 19 | $ 7.20 5 |
| 10. | $ 1110.23 4 | 20. | $ 1.05 7 |

| | | | |
|---|---|---|---|
| | (Art. 195 p. 201.) | 9. | $ 14.15 1 |
| 1. | $ 10.08 | 10. | $ 33.97 9 |
| 2. | $ 97.18 | 11. | $ 1645.02 |
| 3. | $ 231.29 9 | 12. | $ 13.91 |
| 4. | $78.41 4 | 13. | $ 209.82 |
| 5. | $ 446.92 9 | 14. | $ 1183.18 |
| 6. | $ 0.84 9 | 15. | $ 21.03 7 |
| 7. | $ 430.36 | 16. | $ 388.94 |
| 8. | $ 137.92 2 | | |

| | | | |
|---|---|---|---|
| | (Art. 196, p. 202.) | 7. | $ 2163.19 9 |
| 2. | $ 745.50 | 8. | $ 274.77 5 |
| 3. | $ 207.27 | 9. | $ 131.99 |
| 4. | $ 19.71 3 | 10. | $ 253.11 9 |
| 5. | $ 61.75 4 | 11. | $ 95.02 8 |
| 6. | $ 1.86 8 | 12. | $ 1904.12 1 |

(2.) (ART. **197**, p. **203.**)

26£. 10s. = 26.50£.
Interest of 1£. = .14
10600
2650
6)3.7100
6183$\frac{1}{3}$
3.0916$\frac{2}{3}$
(Carried up.)

(Brought up.)
3.0916$\frac{2}{3}$
20
1.8333$\frac{1}{3}$
12
10.0000
3£. 1s. 10d. Ans.

(3.)

42£. 18s. = 42.90£.
Interest of 1£. = .109$\frac{1}{6}$
38610
4290
715
4.68325
20
13.66500
12
7.98
4
3.92
4£. 13s. 7$\frac{3}{4}$d. Ans.

(4.)

94£. 12s. 6d. = 94.625£.
Interest of 1£. = .271$\frac{1}{6}$
94625
662375
189250
15770
$\frac{2}{6}$ = $\frac{1}{3}$)25.659145
8.553048
34.212193
20
4.243860
12
2.92632
4
3.70528
34£. 4s. 2$\frac{3}{4}$d. Ans.

## MISCELLANEOUS EXERCISES IN INTEREST.

### (PAGE 204.)

NOTE. — When the required interest is more or less than 6 per cent., we may first find the interest at 6 per cent. by the foregoing Rules, then divide this interest by 6, and the quotient will be the interest of the required sum at 1 per cent. Then, if we multiply the 1 per cent. by the required per cent., we obtain the answer. Or the pupil, if he please, can perform the following questions by Article 200.

(1.)

| y. | mo. | d. |
|---|---|---|
| 1852 | 6 | 9 |
| 1850 | 8 | 25 |
| 1 | 9 | 14 |

$ 172.50
.107⅓
120750
17250
5750
$ 18.51 500

(2.)

| y. | mo. | d. |
|---|---|---|
| 1851 | 4 | 5 |
| 1848 | 11 | 10 |
| 2 | 4 | 25 |

$ 169.75
.144⅙
67900
67900
16975
2829
$ 24.47 229

(3.)

| y. | mo. | d. |
|---|---|---|
| 1851 | 8 | 1 |
| 1847 | 6 | 29 |
| 4 | 1 | 2 |

$ 17.18
.245⅓
8590
6872
3436
572
$ 4.21 482

(4.)

| y. | mo. | d. |
|---|---|---|
| 1851 | 11 | 11 |
| 1849 | 3 | 7 |
| 2 | 8 | 4 |

$ 67.07
.160⅔
402420
6707
4471
$ 10.77 591

(5.)

| y. | mo. | d. |
|---|---|---|
| 1851 | 11 | 19 |
| 1849 | 0 | 7 |
| 2 | 11 | 12 |

$ 117.75
.177
82425
82425
11775
$ 20.84 175

(6.)

| y. | mo. | d. |
|---|---|---|
| 1853 | 0 | 11 |
| 1849 | 9 | 9 |
| 3 | 3 | 2 |

$ 847.15
.195⅓
423575
762435
84715
28238
$ 165.47 663

(7.)

| y. | mo. | d. |
|---|---|---|
| 1852 | 1 | 11 |
| 1851 | 2 | 1 |
|  | 11 | 10 |

$ 7.18
.056⅔
4308
3590
478
$ .40 686

(8.)

| y. | mo. | d. |
|---|---|---|
| 1855 | 10 | 25 |
| 1852 | 4 | 29 |
| 3 | 5 | 26 |

$ 976.18
.209⅓
878562
195236
32539
$ 204.34 701

(9.)

| y. | mo. | d. |
|---|---|---|
| 1852 | 2 | 9 |
| 1849 | 6 | 25 |
| 2 | 7 | 14 |

$ 144
.157⅓
1008
720
14448
22.656
144.
$ 166.65 6

(10.)

```
  y.   mo.  d.          y.   mo.  d.
1852   0    1         1852   0    1
1850   0   19         1851   3   23
-------------         -------------
   1  11   12                8    8

   $ 375.83              $ 76.19
       .117                .041⅓
   --------             --------
     263081                7619
     37583               30476
    37583                  2539
  ---------              --------
   43.97 211              3.14 918
  375.83                 76.19
  ----------            ----------
  419.80 211            $ 79.33 918
   79.33 918
  ----------
$ 499.14 129
```

(11.)

```
  y.   mo.  d.
1851   5   11
1850   5    5
-------------
   1   0    6

    $ 68.19
       .061
    -------
       6819
     40914
   ---------
 6)4.15 959
     .69 326
   ---------
 $ 4.85 285
```

(12.)

```
  y.   mo.  d.
1852  11   30
1849   1   17
-------------
   3  10   13

    $ 79.15
      .232⅙
    -------
      15830
     23745
    15830
       1319
   ----------
 6)18.37 599
    3.06 266
          7½
   ----------
   21.43 862
    1.53 133
   ----------
   22.96 995
   79.15
   ----------
$ 102.11 995
```

(13.)

```
  y.   mo.  d.
1851  11    9
1850   5   19
-------------
   1   5   20

    $ 89.96
      .088⅓
    -------
      71968
     71968
       2998
   ---------
 6)7.94 646
    1.32 441
          8¼
   ----------
   10.59 528
     .33 110
   ----------
   10.92 638
   89.96
   ----------
$ 100.88 638
```

(14.)

```
  y.   mo.  d.
1851   6    4
1849   5    5
-------------
   2   0   29

    $ 325.00
       .124⅚
    --------
      130000
      65000
     32500
       27000
   ----------
 6)40.57 000
    6.76 166
          7¼
   ----------
   47.33 162
    1.69 041
   ----------
   49.02 203
  325.
   ----------
$ 374.02 203
```

(15.)

```
   y.   mo.  d.
1852    9    9
1849   11   29
---------------
   2    9   10

     $1728
      .166⅔
     ------
     10368
    10368
    1728
      1152
    --------
  6)288.000
     48.000
          9
    -------
    432.000
   1728.
   --------
  $2160.000
```

(16.)

```
   y.   mo.  d.
1852    6    4
1851    0   29
---------------
   1    5    5

    $976.18
       .085⅚
    --------
     488090
    780944
      81348
   ---------
   83.78 878
           2
  ----------
$ 167.57 756
```

(17.)

```
   y.   mo.  d.
1853    8   25
1851    4    7
---------------
   2    4   18

     $175.08
        .143
     -------
       52524
      70032
     17508
   ----------
  6)25.03 644
     4.17 274
   ----------
    29.20 918
   175.08
  ----------
$ 204.28 9
```

(18.)

```
   y.   mo.  d.
1854    8    9
1853   11   11
---------------
        8   28

     $160
      .044⅔
     ------
       640
      640
       106
     ------
   6)7.14 6
     1.19 1
     ------
     8.33 7
   160.
   ---------
 $ 168.33 7
```

## PARTIAL PAYMENTS.

(ART. 198, p. 205.)

(2.)

| | | |
|---|---|---|
| Principal, | | $ 987.75 |
| Interest for 9 months, 2 days, | | 44.77 |
| | Amount, | $ 1032.52 |
| First payment, | $ 300.00 | |
| Interest for 7 months, 12 days, | 11.10 | |
| Second payment, | 400.00 | |
| Interest for 6 months, 8 days, | 12.53 | |
| Third payment, | 150.00 | |
| Interest for 2 months, 18 days, | 1.95 | |
| | | $ 875.58 |
| Balance remains due Dec. 13, 1852, | | $ 156.94 |

| y. mo. d. | y. mo. d. | y. mo. d. | y. mo. d. |
|---|---|---|---|
| 1852 11 13 | 1852 11 13 | 1852 11 13 | 1852 11 13 |
| 1852 0 11 | 1852 4 1 | 1852 5 5 | 1852 8 25 |
| 11 2 | 7 12 | 6 8 | 2 18 |
| 2 0 | | | |
| 9 2 | | | |
| $ 987.75 | $ 300 | $ 400 | $ 150 |
| .045⅓ | .037 | .031⅓ | .013 |
| 493875 | 2100 | 400 | 450 |
| 395100 | 900 | 1200 | 150 |
| 32925 | $ 11.10 0 | 133 | $ 1.95 0 |
| $ 44.77 800 | | $ 12.53 3 | |

(3.)

| | | |
|---|---|---|
| Principal, | | $ 800.00 |
| Interest for 10 months, 27 days, | | 43.60 |
| | Amount, | $ 843.60 |
| First payment, | $ 144.00 | |
| Interest for 9 months, 21 days, | 6.98 | |
| Second payment, | 90.00 | |
| Interest for 7 months, | 3.15 | |
| Amounts carried forward, | $ 244.13 | $ 843.60 |

| | | |
|---|---|---|
| Amounts brought forward, | $ 244.13 | $ 843.60 |
| Third payment, . . . . . . | 400.00 | |
| Interest for 5 months, . . . . . | 10.00 | |
| Fourth payment, . . . . . . . | 100.00 | |
| Interest for 2 months, 27 days, . . | 1.45 | |
| | | $ 755.58 |
| Remains due June 1, 1853, . . . . | | $ 88.02 |

| y. | mo. | d. |
|---|---|---|
| 1853 | 5 | 1 |
| 1852 | 6 | 4 |
| | 10 | 27 |

$ 800
.054½
3200
4000
400
$ 43.60 0

| y. | mo. | d. |
|---|---|---|
| 1853 | 5 | 1 |
| 1852 | 7 | 10 |
| | 9 | 21 |

$ 144
.048½
1152
576
72
$ 6.98 4

| y. | mo. | d. |
|---|---|---|
| 1853 | 5 | 1 |
| 1852 | 10 | 1 |
| | 7 | 0 |

$ 90
.035
450
270
$ 3.15 0

| y. | mo. | d. |
|---|---|---|
| 1853 | 5 | 1 |
| 1853 | 0 | 1 |
| | 5 | 0 |

$ 400
.025
2000
800
$ 10.00,0

| y. | mo. | da. |
|---|---|---|
| 1853 | 5 | 1 |
| 1853 | 2 | 4 |
| | 2 | 27 |

$ 100
.014½
400
100
50
$ 1.45 0

(Art. **200**, p. **208**.)

(2.)

| | |
|---|---|
| Principal, carrying interest from June 5, 1848, . | $ 1666.00 |
| Interest from June 5, 1848, to January 1, 1851, 30 months, 26 days, . . . . . . . | 257.11 |
| Amount carried forward, | $ 1923.11 |

| | | |
|---|---|---|
| Amount brought forward, | | $ 1923.11 |
| First payment, July 4, 1849, a sum less than the interest, | $ 100.00 | |
| Second payment, Jan. 1, 1850, a sum less than the interest, | 10.00 | |
| Third payment, July 4, 1850, a sum less than the interest, | 15.00 | |
| Fourth payment, Jan. 1, 1851, a sum larger than the interest, | 500.00 | |
| | | 625.00 |
| | | 1298.11 |
| Interest from Jan. 1, 1851, to Feb. 7, 1852, 13 months, 6 days, | | 85.67 |
| Amount, | | 1383.78 |
| Fifth payment, Feb, 7, 1852, | | 656.00 |
| | | 727.78 |
| Interest from Feb. 7, 1852, to Jan. 1, 1853, 10 months, 24 days, | | 39.30 |
| Remains due Jan. 1, 1853, | | $ 767.08 |

(3.)

| | |
|---|---|
| Principal on interest from Oct. 23, 1850, | $ 960.00 |
| Interest from Oct. 23, 1850, to Sept. 25, 1851, 11 months, 2 days, | 61.97 |
| Amount, | 1021.97 |
| First payment, Sept. 25, 1851, | 140.00 |
| New principal, carrying interest from Sept. 25, 1851, | 881.97 |
| Interest from Sept. 25, 1851, to July 7, 1852, 9 months, 12 days, | 48.36 |
| Amount, | 930.33 |
| Second payment, July 7, 1852, | 80.00 |
| New principal, carrying interest from July 7, 1852, | 850.33 |
| Interest from July 7, 1852, to Dec. 9, 1852, 5 months, 2 days, | 25.13 |
| Amount carried forward, | $ 875.46 |

| | |
|---|---|
| Amount brought forward, | $ 875.46 |
| Third payment, Dec. 9, 1852, | 70.00 |
| New principal, carrying interest from Dec. 9, 1852, | 805.46 |
| Interest from Dec. 9, 1852, to Nov. 8, 1853, 10 months, 29 days, | 51.52 |
| Amount, | 856.98 |
| Fourth payment, Nov. 8, 1852, | 100.00 |
| New principal, carrying interest from Nov. 8, 1853, | 756.98 |
| Interest from Nov. 8, 1853, to Oct. 23, 1854, 11 months, 15 days, | 50.78 |
| Balance due Oct. 23, 1854, | $ 807 76 |

(4.)

| | |
|---|---|
| Principal on interest from March 1, 1849, | $ 1000.00 |
| Interest from March 1, 1849, to March 1, 1850, 12 months, | 70.00 |
| Amount, | 1070.00 |
| First payment, March 1, 1850, | 100.00 |
| Principal, carrying interest from March 1, 1850, | 970.00 |
| Interest from March 1, 1850, to Sept. 25, 1851, 18 months, 24 days, | 106.37 |
| Amount, | 1076.37 |
| Second payment, Sept. 25, 1851, | 200.00 |
| Principal, carrying interest from Sept. 25, 1851, | 876.37 |
| Interest from Sept. 25, 1851, to Oct. 9, 1852, 12 months, 14 days, | 63.73 |
| Amount | 940.10 |
| Third payment, Oct. 9, 1852, | 150.00 |
| Principal, carrying interest from Oct. 9, 1852, | 790.10 |
| Interest from Oct. 9, 1852, to Oct. 9, 1853, 12 months, | 55.30 |
| Amount carried forward, | $ 845.40 |

| | | |
|---|---|---|
| Amount brought forward, | | $ 845.40 |
| Fourth payment, July 4, 1853, a sum less than the interest, . . . . . . | $ 20.00 | |
| Fifth payment, Oct. 9, 1853, a sum greater than the interest, . . . . . | 300.00 | |
| | | 320.00 |
| Principal, carrying interest from Oct. 9, 1853, . | | 525.40 |
| Interest from Oct. 9, 1853, to Dec. 1, 1854, 13 months, 22 days, . . . . . . . | | 42.09 |
| Balance due Dec. 1, 1854, . . . . . . | | $ 567.49 |

(Art. **201**, p. **209.**)

(1.)

| | |
|---|---|
| Principal, . . . . . . . . . . | $ 500.00 |
| Interest from July 1, 1854, to Sept. 1, 1855, 14 months, | 35.00 |
| Amount, | 535.00 |
| First payment, Sept. 1, 1855, . . . . . . | 100.00 |
| Balance for new principal, . . . . . . | 435.00 |
| Interest from Sept. 1, 1855, to Sept. 1, 1856, 1 year, | 26.10 |
| Amount, | 461.10 |
| Amount of 2d payment, from April 1, 1856, to Sept. 1, 1856, 5 months, . . . . . . . . | 147.60 |
| Balance for new principal, . . . . . . | 313.50 |
| Interest from Sept. 1, 1856, to Sept. 1, 1857, 1 year, | 18.81 |
| Amount, | 332.31 |
| Amount of 3d payment, from Jan. 1, 1857, to Sept. 1, 1857, 8 months, . . . . . . . . | 94.12 |
| Balance for new principal, . . . . . . | 238.19 |
| Interest from Sept. 1, 1857, to Dec. 1, 1858, 15 months, | 17.86 |
| Amount, | 256.05 |
| Fourth payment, . . . . . . . . . | 168.05 |
| Balance for new principal, . . . . . . | 88.00 |
| Interest from Dec. 1, 1858, to Oct. 1, 1859, 10 months, | 4.40 |
| Amount due Oct. 1, 1859, . . . . . . . | $ 92.40 |

### PROBLEMS IN INTEREST.

2. (ART. **204**, p. **211**.) $ 250 × .0125 = $ 3.125; $ 28.125 ÷ 3.125 = 9 per cent. Ans.
3 $ 72 × .0175 = $ 1.26; $ 8.82 ÷ 1.26 = 7 per cent. Ans.
4. $ 500 × .025 = $ 12.50 ; $ 550 — $ 500 = $ 50 ; 50 ÷ 12.50 = 4 per cent. Ans.
5. $ 700 × .015 = $ 10.50 ; $ 63.00 ÷ $10.50 = 6 per cent Ans.
6. $ 922 × .01$\frac{1}{6}$ = $ 10.75$\frac{2}{3}$ ; $ 53.78$\frac{1}{3}$ ÷ $ 10.75$\frac{2}{3}$ = 5 per cent. Ans.

2. (ART. **205**.) $ 140 × .06 = $ 8.40; 42.00 ÷ 8.40 = 5 years, Ans.
3. $ 165 × .06 = $ 9.90; 14.85 ÷ 9.90 = 1 year, 6 months, Ans.
4. $ 98 × .08 = $ 7.84; 25.48 ÷ 7.84 = 3 years, 3 months, Ans.
5. $ 727.60 — $ 680 = $ 47.60 ; $ 680 × .04 = $ 27.20; 47.60 ÷ 27.20 = 1 year, 9 month, Ans.

2. (ART. **206**, p. **212**.) $ 1.00 × .255 = $ 0.255 ; $ 24.225 ÷ .255 = $ 95 Ans.
3. $ 1.00 × .28 = $ 0.28; $ 5.11 ÷ .28 = $ 18.25 Ans.
4. $ 1.00 × .15 = $ 0.15; $ 42 ÷ .15 = $ 280 Ans.

---

## COMPOUND INTEREST.

2. (ART. **208**, p. **214**.) $ 761.75 × 1.06 × 1.06 × 1.06 × 1.06 = $ 961.691 ; $ 961.691 — $ 761.75 = $ 199.941 Ans.
3. $ 67.25 × 1.06 × 1.06 × 1.06 = $ 80.095 Ans.
4. $ 78.69 × 1.07 × 1.07 × 1.07 × 1.07 × 1.07 = $ 110.364 Ans.
5. $ 128 × 1.06 × 1.06 × 1.06 × 1.028 = 156.71,7 Ans.
6. $ 76.18 × 1.06 × 1.06 × 1.041$\frac{1}{2}$ = $ 89.147 ; $ 89.147 — $ 76.18 = $ 12.967 Ans.

2. (**Art. 209**, p. **215.**) $ 1.315931, amount of $ 1 for 7 years at 4 per cent.; $ 884 × 1.315931 = $ 1163.28,3; $ 1163.283 — $ 884 = $ 279.283 Ans.
3. $ 1.551328, amount of $ 1 for 9 years at 5 per cent.; $ 721 × 1.551328 = $ 1118.507 · $ 1118.507 — $ 721 = $ 397.507 Ans.
4. $ 1.425760, amount of $ 1 for 12 years at 3 per cent.; $ 960 × 1.425760 = $ 1368.7296; $ 1.015, amount of $ 1 for 6 months at 3 per cent.; $ 1368.7296 × 1.015 = $ 1389.26 Ans.
5. $ 3.869685, amount of $ 1 for 20 years at 7 per cent.; $ 25.50 × 3.869685 = $ 98.67696; $ 1.014, amount of $ 1 for 2 months and 12 days at 7 per cent.; $ 98.67696 × 1.014 = $ 100.058 Ans.
6. $ 12 × 1.005 × 1.005 × 1.005 × 1.005 × 1.005 × 1.005 = $ 12.364+ Ans.
7. $ 100 × $1.000\frac{1}{6}$ × $1.000\frac{1}{6}$ × $1.000\frac{1}{6}$ × $1.000\frac{1}{6}$ × $1.000\frac{1}{6}$ × $1.000\frac{1}{6}$ = $ 100.10004 Ans.

## DISCOUNT.

2. (**Art. 213**, p. **217.**) $ 1.06, amount of $ 1 for 1 year; $152.64 ÷ 1.06 = $ 144 Ans.
3. $ 1.24 amount of $ 1 for 4 years; $ 477.71 ÷ 1.24 = $ 385.25 Ans.
4. $ 1.20 amount of $ 1 for 3 years, 4 months; $ 172.86 ÷ 1.20 = $ 144.05; $ 172.86 — $ 144.05 = $ 28.81 Ans.
5. $ 1.218 amount of $ 1 for 3 years, 7 months, 18 days; $ 800 ÷ 1.218 = $ 656.814+; $ 800 — $ 656.814 = $ 143.186 Ans.

| | y. | mo. | d. |
|---|---|---|---|
| 6. | 1854 | 0 | 1 |
| | 1852 | 9 | 4 |
| | 1 | 2 | 27 |

$ 1.0745, amount of $1.00 for 1 year, 2 months, 27 days; $ 375.75 ÷ 1.0745 = $ 349.697 Ans.

|  | y. | mo. | d. |
|---|---|---|---|
| 7. | 1853 | 3 | 5 |
|  | 1853 | 0 | 1 |
|  |  | 3 | 4 |

$ 1.015⅔, amount of $ 1.00 for 3 months, 4 days; $ 125.75 ÷ 1.015⅔ = $ 123.81+ Ans.

## COMMISSION, BROKERAGE, AND STOCKS.

(Art. **215**, p. **219**.)

(2.)
$ 5678
.03
$ 170.34

(3.)
$ 7896
.02
$ 157.92

(4.)
$ 1728
.01½
1728
864
$ 25.92

(5.)
$ 15.50
97
10850
13950
1503.50
.02½
30.0700
7.5175
$37.5875

(6.)
$ 6.50
500
3250.00
242.00
593.60
4085.60
.03¾
1225680
306420
$ 153.2100

$ 2.75
88
2200
2200
$ 242.00

$ 10.60
56
6360
530
$ 593.60

(7.)
$ 2500
.00½
$ 12.50

(8.)
$ 46256
.00⅛
$ 57.82

(9.)
2)205.00
$ 102.50

2. (Art. **216**, p. **220**.) $ 2000 ÷ 1.015 = $ 1970.443, sum invested; $ 2000 — $ 1970.443 = $ 29.557, commission, Ans.

3. $ 5256 ÷ 1.03 = $ 5102.912; $ 5256 — $ 5102.912 = $ 153.088 Ans.

4. $ 3865.94 ÷ 1.04 = $ 3717.25, sum expended; $ 3865.94 − $ 3717.25 = $ 148.69, commission, Ans.
5. $ 10000 ÷ 1.03,25 = $ 9685.23+, value of flour; $ 10000 − $ 9685.23+ = $ 314.76+, commission, Ans.

(Art. **217**, p. **220.**)

2. $ 100 × 10 = $ 1000; $1000 × .15 = $ 150; $ 1000 + $ 150 = $1150 Ans.
3. $ 100 × 75 = $ 7500; $ 7500 × .25 = $ 1875; 7500 + $ 1875 = $ 9375.
4. $ 8979 × .12 = $ 1077.48; $ 8979 + $ 1077.48 = $ 10056.48 Ans.
5. $ 1789 × .09 = $ 161.01; $ 1789 − $ 161.01 = $ 1627.99 Ans.
6. $ 100 × 5 = $ 500; $ 500 × .12 = $ 60 Ans.
7. $ 100 × 20 = $ 2000 × .12½ = $ 250; $ 2000 − $ 250 = $ 1750 Ans.
8. $ 100 × 15 = $ 1500 × .08¼ = $ 123.75; $ 1500 + $ 123.75 = $ 1623.75 Ans.
9. $ 175 × 87 = $ 15225; 15225 × 31½ = $ 4795.875 Ans.

---

## BANK DISCOUNT.

(Art. **220**, p. **223.**)

| (2.) | (3.) | (4.) | (5.) |
|---|---|---|---|
| $ 478 | $ 780 | $ 1728 | $ 1000 |
| .010½ | .005½ | .15½ | .20½ |
| 4780 | 3900 | 8640 | 20000 |
| 239 | 390 | 1728 | 500 |
| $ 5.01 9 | $ 4.29 0 | 864 | $ 20.50 0 |
| | | $ 26.78 4 | |
| | | | $ 1000 |
| | | | 20.50 |
| | | | Ans. $ 979.50 |

| (6.) | (7.) | (8.) |
|---|---|---|
| $ 875.35 | $ 596.24 | $ 1350.50 |
| .038 | .042 | .080½ |
| 700280 | 119248 | 10804000 |
| 262605 | 238496 | 67525 |
| 6)33.26 330 | 25.04 208 | 108.71 525 |
| 5.54 386 | 8 | 5 |
| $ 38.80 716 | 6)200.33 664 | 6)543.57 625 |
| $ 875.35 0 | $ 33.38 944 | Ans. $ 90.59 604 |
| 38.80 7 | $ 596.24 0 | |
| $ 836.54 2 Ans. | 33.38 9 | |
| | $ 562.85 1 Ans. | |

### (Art. 221, p. 224.)

2. $ 1.0000 — .0205 = .9795; $ 300 ÷ .9795 = $ 306.278 Ans.
3. $ 1.0000 — .0305 = .9695; $ 4572.40 ÷ .9695 = $ 4716.245 Ans.
4. $ 1.0000 — .0255 = .9745; $ 1000 ÷ .9745 = $ 1026.167 Ans.
5. $ 1.000000 — .050625 = .949375; $ 483.56 ÷ .949375 = $ 509.345 Ans.

## INSURANCE.

### (Art. 223, p. 225.)

| (2.) | (3.) | (4.) |
|---|---|---|
| $ 868 | $ 1728 | $ 3500 |
| .12 | .15 | .01¾ |
| $ 104.16 | 8640 | 3500 |
| | 1728 | 2625 |
| | $ 259.20 | $ 61.25 |

| (5.) | (6.) |
|---|---|
| $ 35000 | $ 75000 |
| .03¾ | .02½ |
| 105000 | 150000 |
| 26250 | 37500 |
| $ 1312.50 | $ 1875.00 premium. |
| $ 35000.00 | $ 75000 |
| 1312.50 | 1875 |
| Ans. $ 33687.50 | $ 73125 loss. |

## CUSTOM-HOUSE BUSINESS.

2. (Art. **225**, p. **226**.) $ 3200 × .20 = $ 640 Ans.
3. 2231 × .04 = $ 89.24; $ 89.24 × .30 = $ 26.772, duty, Ans.
4. 1691 × .05 = $ 84.55; $ 84.55 × .20 = $ 16.91, duty, Ans.
5. 150 × 10 = 1500; 1500 — 50 = 1450; 1450 × .25 = $ 362.50; $ 362.50 × .20 = $ 72.50 Ans.
6. 450 × .15 = 67½lb.; 450 — 67½ = 382½lb.; 382½lb. × 13 = 4972½lb.; 4972½lb. × .08 = $ 397.80; $ 397.80 × .30 = $ 119.34 Ans.
7. 1376 × $ 4.84 = $ 6659.84; $ 6659.84 × .30 = $ 1997.952 Ans.
8. $ 2340 × .80 = $ 1872 Ans.

## ASSESSMENT OF TAXES.

### (Art. **227**, p. **228**.)

(2.)

$ 1.25 × 600 = $ 750, amount assessed on the polls.
$ 3600 — $ 750 = $ 2850, amount to be assessed on the property.
$ 560,000 + $ 152,500 = $ 712,500, amount of taxable property.
$ 2850 ÷ 712,500 = $ .004, tax on $ 1.00.

$ 4100 × .004 = $ 16.40, B's tax on real estate.
$ 1800 × .004 = $ 7.20, B's tax on personal property.
$ 1.25 × 4 = $ 5.00, B's tax on 4 polls.
$ 16.40 + $ 7.20 + $ 5.00 = $ 28.60, B's tax.

(3.)

$ 15,800 × .004 = $ 63.20 Ans.

(4.)

$ 40,000 × .004 = $ 160, tax on D's real estate.
$ 23,600 × .004 = $ 94.40, tax on D's personal property.
$ 1.25 × 3 = $ 3.75, D's tax for 3 polls.
$ 160 + $ 94.40 + $ 3.75 = $ 258.15, amount of D's tax, Ans.

### (Art. 228, p. 229.)

(1.)

$ 1.50 × 500 = $ 750.00, amount assessed on the polls.
$ 3900 — $ 750 = $ 3150, amount to be assessed on the property.
$ 840,000 + $ 210,000 = $ 1,050,000, am't of taxable property.
$ 3150 ÷ 1,050,000 = $ .003, assessment on $ 1.00.

(3.)

| | | | |
|---|---|---|---|
| $ 3175 | Tax on | $ 9000 = | $ 27.00 |
| $ 6535 | " | 700 = | 2.10 |
| $ 9710 | " | 10 = | .03 |
| | " | 6 polls = | 9.00 |
| | | Ans. | $ 38.13 |

(4.)

| | | |
|---|---|---|
| Tax on | $ 7000 = | $ 21.00 |
| " | 900 = | 2.70 |
| " | 80 = | .24 |
| | Ans. | $ 23.94 |

(5.)

| | | | |
|---|---|---|---|
| Tax on | $ 4000 = | $ 12.00 | |
| " | 700 = | 2.10 | |
| " | 90 = | .27 | $ 9280 |
| " | 2 polls = | 3.00 | $ 3600 |
| | Ans. | $ 17.37 | $ 12880 |

(6.)

| | | |
|---|---|---|
| Tax on | $ 12000 = | $ 36.00 |
| " | 800 = | 2.40 |
| " | 80 = | .24 |
| " | 4 polls = | 6.00 |
| | Ans. | $ 44.64 |

## EQUATION OF PAYMENTS.

(Art. **230**, p. **231**.)

(2.)

$$\begin{array}{rcrcr}
\$\,250 & \times & 4 & = & 1000 \\
\$\,350 & \times & 8 & = & 2800 \\
\$\,\underline{400} & \times & 12 & = & \underline{4800} \\
\$\,1000 & & & 1000) & 8600(8\text{mo.} \\
 & & & & \underline{8000} \\
 & & & & 600 \\
 & & & & \underline{30} \\
 & & & 1000) & 18000(18\text{da.} \\
 & & & & \underline{18000}
\end{array}$$

Ans. 8mo. 18d.

(3.)

$$\begin{array}{rcrcr}
\$\,390 & \times & 3 & = & 1170 \\
\$\,312 & \times & 6 & = & 1872 \\
\$\,260 & \times & 8 & = & 2080 \\
\$\,\underline{598} & \times & 10 & = & \underline{5980} \\
\$\,1560 & & & 1560) & 11102(7\tfrac{91}{780}\text{mo.} \\
 & & & & \underline{10920} \\
 & & & & \dfrac{182}{1560} = \tfrac{91}{780}
\end{array}$$

(4.)

$$\begin{array}{rcrcr}
\$\,1000 & & & & \\
\$\,1000 & \times & 12 & = & 12000 \\
\$\,\underline{2000} & \times & 24 & = & \underline{48000} \\
\$\,4000 & & & 4000) & 60000(15\text{mo.}
\end{array}$$

(5.)

$$\begin{array}{rcrcr}
\$\,1250 & & & & \\
\$\,1250 & \times & 6 & = & 7500 \\
\$\,1000 & \times & 9 & = & 9000 \\
\$\,\underline{1500} & \times & 12 & = & \underline{18000} \\
\$\,5000 & & & 5000) & 34500(6\text{mo.} \\
 & & & & \underline{30000} \\
 & & & & 4500 \\
 & & & & \underline{30} \\
 & & & 5000) & 135000(27\text{da.} \\
 & & & & \underline{10000} \\
 & & & & 35000 \\
 & & & & \underline{35000}
\end{array}$$

(Art. **231**, p. **233**.)

(2.)

$$\begin{array}{lrrcrcr}
\textbf{Due April} & 15, & \$\,96.46 & & & & \\
\text{“} & 23, & 49.66 & \times & 8 & = & 39704 \\
\textbf{May} & 1, & 175.80 & \times & 16 & = & 281280 \\
\text{“} & 11, & 78.39 & \times & 26 & = & 203814 \\
\textbf{Sept.} & 19, & \underline{114.92} & \times & 157 & = & \underline{1804244} \\
 & & \$\,515.20 & & & 51520) & 2329042(45+\text{da.} \\
 & & & & & & \underline{206080} \\
 & & & & & & 268242 \\
 & & & & & & \underline{257600} \\
 & & & & & & 10642
\end{array}$$

**Ans. May 30, or in 45da.**

(3.)

| | | | | |
|---|---|---|---|---|
| Due May | 7, 1854, | $ 375.60 | | |
| Aug. | 18, " | 687.25 | × 103 = | 7078675 |
| Dec. | 7, " | 568.50 | × 214 = | 12165900 |
| March | 1, 1855, | 100.00 | × 298 = | 2980000 |
| " | 25, " | 300.00 | × 322 = | 9660000 |
| Aug | 5, " | 675.75 | × 455 = | 30746625 |
| | | $ 2707.10 | | |

270710)62631200(231+da.  
541420  
848920  
812130  
367900  
270710  
97190

Ans. Dec. 24, or in 231da.

(4.)

| | | | | |
|---|---|---|---|---|
| Due April | 1, 1857, | $ 436.50 | | |
| " | 11, " | 129.50 | × 10 = | 129500 |
| July | 15, " | 132.00 | × 105 = | 1386000 |
| Sept. | 1, " | 405.00 | × 153 = | 6196500 |
| " | 5, " | 72.00 | × 157 = | 1130400 |
| Oct. | 25, " | 91.00 | × 207 = | 1883700 |
| Mar. | 1, 1858, | 120.00 | × 334 = | 4008000 |
| | | $ 1386.00 | | |

138600)14734100(106+da.  
138600  
874150  
831600  
42550

Ans. July 16, or in 106da.

(5.)

Due July 1, 1854, $300 =
Nov. 1, " 500 × 4 = 2000
March 1, 1855, 200 × 8 = 1600
Oct. 1, " 800 × 15 = 12000
April 1, 1857, 400 × 33 = 13200
July 1, " 900 × 36 = 32400
Aug. 1, " 100 × 37 = 3700
$ 3200 3200)64900(20mo. 8da.
6400
900
30
3200(27000(8+da.
25600
Ans. March 9, 1856. 1400

(Art. **232**, p. **234.**)

(2.) March 11, 1855 + 4 months =
July 11, 1855. 1855.
Dr. $ 1850. April 7, $ 400 × 95 = 38000 Cr
May 15, 270 × 57 = 15390
June 20, 350 × 21 = 7350
$ 1020 $ 60740

$ 1850 — $ 1020 = $ 830; 60740 ÷ 830 = 73 days
July 11 + 73 = September 22, 1855, Ans.

(3.) June 12, 1855 + 8 months =
Feb. 12, 1856
Dr. $1200. Sept. 1, $ 400 × 164 = 65600 Cr.
Nov. 1, 200 × 103 = 20600
Dec. 1, 100 × 73 = 7300
$ 700 $ 93500

$ 1200 — $ 700 = 500; 93500 ÷ 500 = 187 days.
Feb. 12 + 187 = August 17, 1856, Ans.

(4.) September 25, 1855 + 6 months =
March 25, 1856.

| | | | | | |
|---|---|---|---|---|---|
| Dr. $ 2838. | Sept. 25, 1855, | $ 1000 × 182 | = | 182000 | Cr |
| | Nov. 1, | 800 × 145 | = | 116000 | |
| | Dec. 21, | 600 × 95 | = | 57000 | |
| | | $ 2400 | | $ 355000 | |

$ 2838 — $ 2400 = $ 438 ; 355000 ÷ 438 = 811 days.
March 25, 1856 + 811 days = June 14, 1858, Ans.

(5.) March 20, 1855 + 6 months =
Sept. 20, 1855.

| | | | | | |
|---|---|---|---|---|---|
| Dr. $ 2000. | March 20, 1855, | $ 500 × 184 | = | 92000 | Cr. |
| | May 10, | 350 × 133 | = | 46550 | |
| | June 7, | 400 × 105 | = | 42000 | |
| | | $ 1250 | | $ 180550 | |

$ 2000 — $ 1250 = $ 750 ; 180550 ÷ 750 = 241 days.
September 20, 1855 + 241 days = May 18, 1856, Ans.

---

## COMPOUND EQUATION OF PAYMENTS.

(Art. **233**, p. **236**.)

(2.) **Debits.**

| | | | |
|---|---|---|---|
| Feb. 16, | $ 375.80 | | |
| Apr. 8, | 432.18 × 51 | = | 2204118 |
| May 17, | 320.15 × 90 | = | 2881350 |
| July 13, | 158.12 × 147 | = | 2324264 |
| | 1286 25 | | 7409832 |

7409832 ÷ 128625 ≐ 58 days. Feb. 16 + 58 = April 15 ; April 15 + 6 m. = Oct. 15, 1854.

**Credits.**

| | | | |
|---|---|---|---|
| Mar. 20, | $ 300 | | |
| July 4, | 200.00 × 106 | = | 2120000 |
| Dec. 17, | 371.50 × 272 | = | 10104800 |
| Mar. 25, 1855, | 85.20 × 370 | = | 3152400 |
| | 956.70 | | 15367200 |

128625 — 95670 = 32955.

15367200(160+
95670 =161 da.
580020
574020
60000

March 20 + 161 days = August 28

From Aug. 28 to Oct. 15 = 48 days; $ 956.70 × 48 = 4592160; 4592160 ÷ 32955 = 139 days. Oct. 15, 1854 + 139 days = March 3, 1855, Ans.

(3.)

*Dr.* *Edward Doton in account with Daniel Stetson.* *Cr.*

| | | | | | |
|---|---|---|---|---|---|
| 1855 | | | 1855 | | |
| May 1, | To Merchandise | $ 500 | Mar. 7, | By Pleasure Boat | $ 400 |
| May 15, | " Timber | 400 | April 2, | " Merchandise | 200 |
| June 14, | " Horse | 300 | May 6, | " " | 300 |
| July 24, | " Labor | 100 | June 13, | " Carriage | 120 |
| | | $ 1300 | | | $ 1020 |

OPERATION.

| Debits. | | | Credits. | | |
|---|---|---|---|---|---|
| May 1, | $ 500 | | March 7, | $ 400 | |
| May 15, | 400 × 14 = | 5600 | April 2, | 200 × 26 = | 5200 |
| June 14, | 300 × 44 = | 13200 | May 6, | 300 × 60 = | 18000 |
| July 24, | 100 × 84 = | 8400 | June 13, | 120 × 98 = | 11760 |
| | $ 1300 | 27200 | | $ 1020 | $ 34960 |

27200 ÷ 1300 = 21 days. May 1 + 21 = May 22; May 22 + 6 months = Nov. 22, 1855.

34960 ÷ 1020 = 34 days; March 7 + 34 = April 10; April 10 + 6 mo = Oct. 10, 1855. Nov. 22 — Oct. 10 = 43 days.

$ 1300 — $ 1020 = $ 280; $ 1020 × 43 = 43860. 43860 ÷ 280 = 157 days; Nov. 22, 1855 + 157 days = April 27, 1856.

## SIMPLE PROPORTION.

5. (ART. **245**, p. **242**.) 63gal. : 9gal. : : $ 14.49 : $ 2.07 Ans
6. 19A. : 97A. : : $ 337.25 : $ 1721.75 Ans.
7. 11da. : 47da. : : 319 miles : 1363 miles, Ans.
8. 15bar. : 79bar. : : $ 120 : $ 632 Ans.
9. 3 days : 12 days : : 9 horses : 36 horses, Ans.
10. 7gal. : 27gal. : : $ 5.88 : $ 22.68 Ans.
11. 9lb. : 147lb. : : $ 10.80 : $ 176.40 Ans.
12. 9 tons : 27 tons : : $ 85.95 : $ 257.85 Ans.
13. 15 tons : 765 tons : : $ 105 : $ 5355 Ans.
14. 16hhd. : 176hhd. : : $ 320 : $ 3520 Ans.
15. 15cwt. 3qr. 17lb. = 1592lb. : 76cwt. 2qr. 19lb. = 7669lb : : $ 124.67 : $ 600.56+ Ans.

16. 1m. : 32m. : : 2m. 8sec. = 128sec. : 4096sec. = 1h. 8m. 16sec. Ans.

17. 1h. = 3600sec. : 9h. 45m. 19sec. = 35119sec. : : 3m. 7fur 18rd. = 1258rd. : 12272+rd. = 38m. 2fur. 32+rd. Ans

18. 21 — 15 = 6rd. : 21rd. : : 96rd. : 336rd. Ans.

19. 4 + 5 = 9 men : 5 men : : 12h. : $6\frac{2}{3}$h. Ans.

20. 10 — 3 = 7 men : 10 men : : 63da. : 90da. Ans.

21. $7.50 : $5.00 : : 5oz. : $3\frac{1}{3}$oz. Ans.

22. 13h. : 14h. : : 10da. : $10\frac{10}{13}$da. Ans.

23. 40lb. : 79lb. : : 29lb. : $57\frac{11}{40}$lb. Ans.

26. $11\frac{4}{5}$yd. : 100yd. : : $4\frac{7}{11}$yd. $= \frac{59}{5} : \frac{100}{1} : : \frac{51}{11} = \frac{5}{59} \times \frac{100}{1} \times \frac{51}{11} = \frac{25500}{649} = 39\frac{189}{649}$yd. Ans.

27. 18da. : 36da. : : 144 men : 108 men; 144 — 108 = 36 men, Ans.

28. $\overset{d.}{6} \cdot \overset{d.}{1} : : \overset{w.}{1} : \overset{w.}{\frac{1}{6}}$, the part James will do in one day.
$8 : 1 : : 1 : \frac{1}{8}$, the part John will do in one day.
$\frac{1}{6} + \frac{1}{8} = \frac{7}{24}$, the part James and John will do in one day.
$\frac{7}{24}$w. : 1w. : : 1da. : $3\frac{3}{7}$da. Ans.

29. 10da. : 1da. : : 1w. : $\frac{1}{10}$w. = part Atwood would do in a day.
7da. : 1da. : : 1w. : $\frac{1}{7}$w. = part Jerry and his father would do in a day.
6d. : 1da. : : 1w. : $\frac{1}{6}$w. = part Jacob and his father would do in a day.
$\frac{1}{7} - \frac{1}{10} = \frac{3}{70}$ = part Jerry would do in a day.
$\frac{1}{6} - \frac{1}{10} = \frac{1}{15}$ = part Jacob would do in a day.
$\frac{3}{70} + \frac{1}{15} = \frac{23}{210}$ = part Jerry and Jacob would do in a day.
$\frac{23}{210}$w. : 1w. : : 1da. : $9\frac{3}{23}$ days, Ans.

31. $5.00 × 40 = $200.00, price given for the cloth;
1.00 : 1.15 : : $200.00 : $230.00 Ans.

32. 1.00 : 0.70 : : $175.00 : $122.50 Ans.

33. $6.00 — $5.00 = $1.00;
$5.00 : $1.00 : : 100 : 20 per cent. Ans.

34. $15.00 — $12.00 = $3.00;
$15.00 : $3.00 : : 100 : 20 per cent. Ans.

35. \$ 0.25 : \$ 27.50 . : 1gal. : 110 gallons, Ans.

36. \$ 15.75 : \$ 1728 :: 1A. : 109A. 2R. 34$\frac{2}{7}$p. Ans.

37. If the first cock will empty the cistern in 2 hours, in 1 hour $\frac{1}{2}$ of it will be emptied. The second cock will empty $\frac{1}{3}$ of it in 1 hour. The third cock will empty $\frac{1}{4}$ of it in 1 hour. Therefore, in 1 hour, $\frac{1}{2}+\frac{1}{3}+\frac{1}{4}=\frac{13}{12}$ of the cistern will be emptied. And if $\frac{13}{12}$ of the cistern be emptied in 1 hour, $\frac{12}{12}$, or the whole cistern, will be emptied in 55$\frac{5}{13}$ minutes; $\frac{13}{12}:\frac{12}{12}$ :: 60m. : 55$\frac{5}{13}$m. Ans.

## COMPOUND PROPORTION.

### (ART. 247, p. 246.)

(3.)

$$\left.\begin{array}{l}\$\,800 : \$\,100\\ \$\,6 : \$\,32\end{array}\right\} :: 12\text{mo.} : 8\text{mo. Ans.}\quad \frac{\cancel{100}\times\overset{4}{\cancel{32}}\times\overset{2}{\cancel{12}}}{\underset{\cancel{8}}{\cancel{800}}\times\cancel{6}}=8\text{mo.}$$

(4.)

$$\left.\begin{array}{l}\$\,6 : \$\,32\\ 8\text{mo.} : 12\text{mo.}\end{array}\right\} :: \$100 : \$800\text{ Ans.}\quad \frac{\overset{4}{\cancel{32}}\times\overset{2}{\cancel{12}}\times 100}{\cancel{6}\times\cancel{8}}=\$\,800$$

(5.)

$$\left.\begin{array}{l}\$\,800 : \$\,100\\ 8\text{mo.} : 12\text{mo.}\end{array}\right\} :: \$\,32 : \$\,6\text{, that is, 6 per cent. Ans.}$$

$$\frac{\cancel{100}\times\overset{6}{12}\times\overset{\cancel{4}}{\cancel{32}}}{\cancel{800}\times\cancel{8}}=\$\,6.$$

(6.)

$$\left.\begin{array}{l}20\text{ men} : 15\text{ men}\\ 10\text{ hours} : 15\text{ hours}\end{array}\right\} :: 60\text{ days} : 67\tfrac{1}{2}\text{ days, Ans.}$$

$$\frac{15\times\overset{3}{\cancel{15}}\times\overset{3}{\cancel{60}}}{\cancel{20}\times\underset{2}{\cancel{10}}}=\frac{135}{2}=67\tfrac{1}{2}\text{ days.}$$

(7.)

$$\left.\begin{array}{l} 351\text{bu.} : 1404\text{bu.} \\ 2\text{w.} : \quad 3\text{w.} \end{array}\right\} :: 939\text{men} : 5634 \text{ men, Ans.}$$

$$\frac{\overset{\overset{2}{\cancel{4}}}{\cancel{1404}} \times 3 \times 939}{\cancel{351} \times \cancel{2}} = 5634 \text{ men.}$$

(8.)

$$\left.\begin{array}{l} 8 \text{ men} : 12 \text{ men} \\ 13 \text{ weeks} : 52 \text{ weeks} \end{array}\right\} :: \$\,64 : \$\,384 \text{ Ans.}$$

$$\frac{12 \times \overset{4}{\cancel{52}} \times \overset{8}{\cancel{64}}}{\cancel{8} \times \cancel{13}} = \$\,384$$

(9)

$$\left.\begin{array}{l} 8 \text{ horses} : 32 \text{ horses} \\ 24 \text{ days} : 48 \text{ days} \end{array}\right\} :: 42 \text{ bushels} : 336 \text{ bushels, Ans.}$$

$$\frac{\overset{4}{\cancel{32}} \times \overset{2}{\cancel{48}} \times 42}{\cancel{8} \times \cancel{24}} = 336 \text{ bushels.}$$

(10.)

$$\left.\begin{array}{lcl} 24 \text{ m[illegible]} & : & 6 \text{ men} \\ 16 \text{ hours} & : & 9 \text{ hours} \\ 20 \text{ feet} & : & 200 \text{ feet} \\ 6 \text{ feet} & : & 16 \text{ feet} \\ 4 \text{ feet} & : & 6 \text{ feet} \end{array}\right\} :: 16 \text{ days} : 90 \text{ days, Ans.}$$

$$\frac{\cancel{6} \times 9 \times \overset{10}{\cancel{200}} \times \cancel{16} \times \cancel{6} \times \overset{\cancel{4}}{\cancel{16}}}{\underset{\cancel{4}}{\cancel{24}} \times \cancel{16} \times \cancel{20} \times \cancel{6} \times \cancel{4}} = 90 \text{ days.}$$

(11.)

$$\left.\begin{array}{l} 15 \text{ days} : 20 \text{ days} \\ 9 \text{ hours} : 12 \text{ hours} \end{array}\right\} :: 117 \text{ miles} : 208 \text{ miles, Ans.}$$

$$\frac{\overset{4}{\cancel{20}} \times \overset{4}{\cancel{12}} \times \overset{13}{\cancel{117}}}{\underset{\cancel{3}}{\cancel{15}} \times \cancel{9}} = 208 \text{ miles.}$$

(12.)

$$\left.\begin{array}{lcl} 30 \text{ men} & : & 12 \text{ men} \\ 30 \text{ feet} & : & 300 \text{ feet} \\ 6 \text{ feet} & : & 8 \text{ feet} \\ 3 \text{ feet} & : & 6 \text{ feet} \\ 8 \text{ hours} & : & 12 \text{ hours} \end{array}\right\} :: 15 \text{ days} : 240 \text{ days, Ans.}$$

$$\frac{\overset{4}{\cancel{12}} \times \overset{10}{\cancel{300}} \times 8 \times \cancel{6} \times \overset{\overset{2}{4}}{\cancel{12}} \times 15}{\cancel{30} \times \underset{3}{\cancel{30}} \times \cancel{6} \times \cancel{3} \times \underset{2}{\cancel{8}}} = 240 \text{ days.}$$

(13.)

$$\left.\begin{array}{lcl} 575 \text{ lb.} & : & 765 \text{ lb.} \\ 150 \text{ miles} & : & 32 \text{ miles} \end{array}\right\} :: \$\,24.58 : \$\,6.97+ \text{ Ans}$$

$$\frac{\overset{51}{\cancel{765}} \times \overset{16}{\cancel{32}} \times 24.58}{575 \times \underset{\underset{5}{\cancel{10}}}{\cancel{150}}} = \frac{2005728}{2875} = \$\,6.97, \text{ Ans}$$

(14.)

$$\left.\begin{array}{lcl} \$\,1800 & : & \$\,600 \\ \$\,9 & : & \$\,9 \end{array}\right\} :: 6 \text{ months} : 2 \text{ months, Ans.}$$

$$\frac{\cancel{600} \times \cancel{9} \times \overset{2}{\cancel{6}}}{\underset{3}{\cancel{1800}} \times \cancel{9}} = 2 \text{ months.}$$

(15.)

$$\left.\begin{array}{lcl} 20 \text{ cows} & : & 28 \text{ cows} \\ 8 \text{ weeks} & : & 12 \text{ weeks} \end{array}\right\} :: 3 \text{ tons} : 6\tfrac{3}{10} \text{ tons, Ans}$$

$$\frac{\overset{7}{\cancel{28}} \times \overset{3}{\cancel{12}} \times 3}{\underset{5}{\cancel{20}} \times \underset{2}{\cancel{8}}} = \frac{63}{10} = 6\tfrac{3}{10} \text{ tons.}$$

(16.)

$$\left.\begin{array}{lcl} 12\tfrac{5}{11} \text{ men} & : & 5 \text{ men} \\ 30 \text{ acres} & : & 54 \text{ acres} \end{array}\right\} :: 10 \text{ days} : 7\tfrac{31}{137} \text{ days, Ans.}$$

$$\frac{5 \times \overset{18}{\cancel{54}} \times \cancel{10}}{\frac{137}{11} \times \underset{3}{\cancel{30}}} = \frac{90}{\frac{137}{11}} = \frac{90}{1} \times \frac{11}{137} = \frac{990}{137} = 7\tfrac{31}{137} \text{ days.}$$

(17.)

$$\left.\begin{array}{lcl} 18 \text{ men} & : & 2 \text{ men} \\ 12\frac{3}{4} \text{ rods} & : & 247\frac{2}{13} \text{ rods} \end{array}\right\} : : 6\frac{1}{2} \text{ days} : 14 \text{ days, Ans.}$$

$$\frac{2 \times \dfrac{\overset{7}{\overset{\cancel{63}}{\cancel{3213}}}}{\cancel{13}} \times \dfrac{\cancel{13}}{2}}{\underset{2}{\cancel{18}} \times \dfrac{\cancel{51}}{\underset{2}{\cancel{4}}}} = 14 \text{ days.}$$

(18.)

$$\left.\begin{array}{lcl} 24 \text{ men} & : & 248 \text{ men} \\ 9 \text{ hours} & : & 11 \text{ hours} \\ 7 \text{ hard.} & : & 4 \text{ hard.} \\ 232\frac{1}{2} \text{ feet} & : & 337\frac{1}{2} \text{ feet} \\ 3\frac{2}{3} \text{ feet} & : & 5\frac{3}{5} \text{ feet} \\ 2\frac{1}{3} \text{ feet} & : & 3\frac{1}{2} \text{ feet} \end{array}\right\} : : 5\frac{1}{2} \text{ days} : 132 \text{ days, Ans.}$$

$$\frac{\overset{31}{\cancel{24\text{[illegible]}}} \times \cancel{11} \times \cancel{4} \times \dfrac{\overset{3}{\overset{\cancel{55}}{\overset{\cancel{135}}{\cancel{675}}}}}{\cancel{2}} \times \dfrac{\overset{4}{\cancel{28}}}{\cancel{5}} \times \dfrac{\cancel{7}}{\cancel{2}} \times \dfrac{11}{\cancel{2}}}{\underset{4}{\cancel{24}} \times \underset{3}{\cancel{9}} \times \cancel{7} \times \dfrac{\cancel{465}}{\cancel{2}} \times \dfrac{\cancel{11}}{\cancel{3}} \times \dfrac{\cancel{7}}{\cancel{3}}} = 132 \text{ days.}$$

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## PROFIT AND LOSS.

3. (Art. 249, p. 249.) \$ 5.40 × 40 = \$ 216, price paid; 40 × $\frac{3}{4}$ = 30; \$ 6.00 × 30 = \$180; 40 × $\frac{1}{4}$ = 10; 7 × 10 = \$ 70; \$ 180 + \$ 70 = \$ 250, price sold at; \$ 250 — \$ 216 = \$ 34; \$ 216 : \$ 34 : : 100 : 15$\frac{20}{27}$ per cent. Ans.

4. \$ 5 × 50 = \$ 250, price paid; \$ 5.98 ÷ 1.04 = \$ 5.75 present worth of \$ 5.98, due 8 months hence; \$ 5.75 ×

50 = \$ 287.50, price sold at; \$ 287.50 — \$ 2.50 = \$ 37.50; \$ 2.50 : \$ 37.50 :: 100 : 15 per cent. Ans.

5. 100 × 0.30 = \$ 30, price paid; 100 — 30 = 70; 70 × 0.40 = \$ 28, price sold at; \$ 30 — \$ 28 = \$ 2; \$ 30 : \$ 2 :: 100 : $6\frac{2}{3}$ per cent. Ans.

6. 3000 × $1.12\frac{1}{2}$ = \$ 3375, price paid; 3000 × 0.05 = \$ 150, cost of transportation; \$ 3375 + \$ 150 = \$ 3525, whole cost; 3000 × $1.37\frac{1}{2}$ = \$ 4125, price sold at; \$ 4125 — \$ 3525 = \$ 600; \$ 3525 : \$ 4125 :: 100 : $17\frac{1}{47}$ per cent. Ans.

7. $7\frac{3}{11}$rd. = $\frac{80}{11}$rd.; $\frac{80}{11} \times \frac{80}{11} = \frac{6400}{121}$rd., contents of the lot; $\frac{6400}{121} \times 5 = \frac{32000}{121}$, price paid; $\frac{\overset{1600}{\cancel{6400}}}{\cancel{121}} \times \frac{\overset{9}{\cancel{1089}}}{\cancel{4}} =$ 14400ft.; 14400 × 0.05 = \$ 720 = \$ $\frac{87120}{121}$; \$ $\frac{87120}{121}$ — \$ $\frac{32000}{121}$ = \$ $\frac{55120}{121}$; \$ $\frac{32000}{121}$ : \$ $\frac{55120}{121}$ :: 100 : $172\frac{1}{4}$ per cent. Ans.

3. (Art. **250**, p. **250**.) 120 × 0.30 = \$ 36.00, price paid; 1.00 : .90 :: \$ 36.00 : \$ 32.40 Ans.

4. 8cwt. 3qr. 5lb. = 880lb.; 1.00 : 1.20 :: \$ 88 : \$ 105.60; \$ 105.60 ÷ 880 = \$ 0.12 per pound, Ans.

5. 1.00 : 1.12 :: \$ 1728 : \$ 1935.36; \$ 1935.36 × 1.04 = \$ 2012.77+, worth of \$ 1935.36, 8 months hence, Ans.

6. 1.00 : 1.10 :: \$ 4.00 : \$ 4.40, price sold at; 32gal. — 8gal. = 24gal.; \$ 4.40 ÷ 24 = \$ $0.18\frac{1}{3}$, price per gallon, Ans.

7. \$ 90 ÷ 1.03 = \$ 87.37+, present worth of \$ 90, due 6 months hence; 1.00 : 1.20 :: \$ 87.37+ : \$ 104.84+, Ans.

8. \$ 11.50 × 7 = \$ 80.50; 1.00 : .85 :: \$ 80.50 : \$ 68.42+, Ans.

3. (Art. **251**, p. **251**.) 1.00 — .625 = $.37\frac{1}{2}$; $.37\frac{1}{2}$ : 1.00 :: \$ 80 : \$ $213.33\frac{1}{3}$, Ans.

4. 1.00 + .20 = 1.20; 1.20 : 1.00 :: \$ 7.20 : \$ 6.00 per cord, Ans.

5. 1.00 + .18 = 1.18; 1.18 : 1.00 :: \$ 1600.00 : 1355.93+, Ans.

6. \$ 8 × 17 = \$ 136; \$ 136 × .0155 = \$ 2.10,8, discount

of $ 136 for 3 months; $ 136 — $ 2.10,8 = $ 133.89+, present worth of $ 136, due 3 months hence; 1.00 — .10 = .90; .90 : 1.00 : : 133.89+ : $ 148.76+, Ans.

2. (Art. 252, p. 252.) 1.00 + .12 = 1.12; $ 0.28 : $ 0.24 : : 1.12 : .96; 1.00 — .96 = .04 = 4 per cent. loss, Ans.

3. 1.00 — .25 = .75; $37.50 : $ 75 : : .75 : 1.50; 1.50 — 1.00 = .50 = 50 per cent. gain, Ans.

4. $ 1728 ÷ 1.045 = $ 1653.58+, present worth of $ 1728, due 9 months hence; $ 1653.58+ : $ 2000 : : 1.10 . 1.33+; 1.33+ — 1.00 = .33+ = 33+ per cent. gain, Ans.

### Miscellaneous Exercises.

1. (p. 253.) $ 84.00 — $ 75.60 = $ 8.40; $84.00 : $8.40 : : 1.00 : .10 = 10 per cent. loss, Ans.

2. 1.00 — .10 = .90; $ 75.60 : $97.44 : : .90 : 1.16; 1.16 — 1.00 = .16 = 16 per cent. gain, Ans.

3. 1.00 + .16 = 1.16; $97.44 : $ 75.60 : : 1.16 : .90; 1.00 — .90 = .10 = 10 per cent. loss, Ans. 1.16 : 1.00 : : $ 97.44 : $ 84, real value of the horse; $ 84 — $ 75.60 = $ 8.40, actual loss, Ans.

4. $5 ÷ $ 1.045 = $ 4.78+, present worth of 5, due 9 months hence; 1.00 + .12 = 1.12; 1.00 : 1.12 : : $ 4.78+ : $ 5.35+, Ans.

5. 1.00 + .10 = 1.10; 1.00 : 1.10 : : $ 40 : $ 44, price sold at; 120gal. — 20gal. = 100gal.; $ 44.00 ÷ 100 = $ 0.44 per gallon, Ans.

6. $ 5 : $ 7.50 : : 1.00 : 1.50; 1.50 — 1.00 = .50 = 50 per cent., Jones' gain; $ 0.10 : $ 0.14 : : 1.00 : 1.40; 1.40 — 1.00 = .40 = 40 per cent., Crosby's gain; 50 — 40 = 10 per cent., Jones' gain more than Crosby's, Ans.

7. $ 0.30 × 40 = $ 12.00; 30 cents on the dollar = .30 of the sum to be paid; $ 12.00 × .30 = $ 3.60, price received for 40gal.; 160gal. — 40gal. = 120gal.; $ 0.35 × 120 = $ 42.00, price received for 120gal.; $ 42.00 + $ 3.60 = $ 45.60, price received for 160gal.; 1.00 + .10 = 1.10; 1.10 : 1.00 : : 45.60 : $ 41.45+, Ans.

8. 1.00 — .10 = .90; .90 : 1.00 : : $ 75.60 : $ 84.00, real value of the horse; 1.00 + .16 = 1.16; 1.00 : 1.16 : : $ 84 : $ 97.44, received for the horse; $ 97.44 — $ 75.60 = $ 21.84; $ 7560 : $ 21.84 : : 1.00 : .28$\frac{8}{9}$ = 28$\frac{8}{9}$ per cent. gained, Ans.

9. 1$\frac{3}{4}$yd. = 1.75; 5 per cent. = .05; 100 — .05 = .95; 1.75yd. × .95 = 1.6625yd., width after shrinking; 70yd. × .95 = 66.5yd., length after shrinking; 66.5yd. × 1.6625 = 110.55+ square yards after shrinking; $ 4.50 × 70 = $ 315.00, price paid; 1.00 + .12 = 1.12; 1.00 : 1.12 : : $ 315.00 : $ 352.80, price sold at; $352.80 ÷ 110.55+ = $3.19+, price per sq. yd. Ans

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## PARTNERSHIP, OR COMPANY BUSINESS.

(Art. **254**, p. **255**.)

(2.)

A's stock, $ 6000 $\frac{6000}{20000}=\frac{3}{10}$, A's fractional part.
B's stock, $ 9000 $\frac{9000}{20000}=\frac{9}{20}$, B's fractional part.
C's stock, $ 5000 $\frac{5000}{20000}=\frac{1}{4}$, C's fractional part.
$ 20000

| | | |
|---|---|---|
| $ 840 | $ 840 | $ 840 |
| 3 | 9 | 1 |
| 10)2520 | 20)7560 | 4)840 |
| $ 252, A's gain. | $ 378, B's gain. | $ 210, C's gain. |

(3.)

Parker, $ 8750 $\frac{8750}{19360}=\frac{875}{1936}$, Parker's part.
Dole, $ 3610 $\frac{3610}{19360}=\frac{361}{1936}$, Dole's part.
Gage, $ 7000 $\frac{7000}{19360}=\frac{700}{1936}$, Gage's part.
$ 19360

$ 6875 — $ 375 = $ 6500

$$\frac{\$\,6500\times 875}{1936}=\$\,2937.75\tfrac{100}{121}=\text{Parker's dividend.}$$

$$\frac{\$\,6500\times 361}{1936}=\$\,1212.03\tfrac{62}{121}=\text{Dole's dividend.}$$

$$\frac{\$\,6500\times 700}{1936}=\$\,2350.20\tfrac{80}{121}=\text{Gage's dividend.}$$

(4.)

A's debt \$ 500 $\frac{500}{2000} = \frac{1}{4}$, A's fractional part.
B's debt \$ 386 $\frac{386}{2000} = \frac{193}{1000}$, B's fractional part.
C's debt \$ 988 $\frac{988}{2000} = \frac{247}{500}$, C's fractional part.
D's debt \$ 126 $\frac{126}{2000} = \frac{63}{1000}$, D's fractional part.
\$ 2000

$\$\frac{100 \times 1}{4} = \$25.00$, A's part.

$\$\frac{100 \times 193}{1000} = \$19.30$, B's part.

$\$\frac{100 \times 247}{500} = \$49.40$, C's part.

$\$\frac{100 \times 63}{1000} = \$6.30$, D's part.

(5.)

The whole gain is \$ 90; but C's gain is \$ 30; A and B's gain, therefore, is \$ 90 — \$ 30 = \$ 60; A's stock being \$ 700, his share of the gain will be $\frac{700}{1000} = \frac{7}{10}$ of \$ 60 = \$ 42. B's stock being \$ 300, his share of the gain will be $\frac{300}{1000} = \frac{3}{10}$ of \$ 60 = \$ 18. As the stock of each person in the firm bears the same proportion to his gain as the other, and as A's gain is \$ 42, and his stock \$ 700, therefore \$ 42 A's gain : \$ 700 A's stock : : \$ 30 C's gain : \$ 500 C's stock. Then \$ 500 ÷ 100 = \$ 5.00, value of C's flour per barrel.

STATEMENT.

$$\left.\begin{array}{l}\$1000 : \$700 :: \$60 : \$42, \text{ A's gain,}\\ \$1000 : \$300 :: \$60 : \$18, \text{ B's gain,}\end{array}\right\}\text{Ans.}$$

\$ 42 : \$ 30 : : \$ 700 : \$ 500, C's stock.
\$ 500 ÷ 100 = \$ 5.00, value of C's flour per barrel, Ans.

(ART. **255**, p. **256**.)

(2.)

\$ 700 × 5 = 3500 $\frac{3500}{13300} = \frac{35}{133}$, A's fraction.
\$ 800 × 6 = 4800 $\frac{4800}{13300} = \frac{48}{133}$, B's fraction.
\$ 500 × 10 = 5000 $\frac{5000}{13300} = \frac{50}{133}$, C's fraction.
\$ 13300

$\frac{\$\,399\times35}{133}=\$\,105$, A's gain. $\frac{\$\,399\times48}{133}=\$\,144$, B's gain.

$\frac{\$\,399\times50}{133}=\$\,150$, C's gain.

(3.)

$$\begin{array}{llr}
\text{Johnson's stock,} & \$\,1000\times6= & 6000 \\
 & \underline{\phantom{\$\,1}500} & \\
 & \$\,1500\times6= & \underline{9000} \\
 & & \$\,15000
\end{array}$$

$\frac{15000}{43100}=\frac{150}{431}$, Johnson.

$$\begin{array}{llr}
\text{Hyde's stock,} & \$\,800\times4= & 3200 \\
 & \underline{\phantom{\$\,}400} & \\
 & \$\,1200\times6= & 7200 \\
 & \underline{\phantom{\$\,}500} & \\
 & \$\,700\times2= & \underline{1400} \\
 & & \$\,11800
\end{array}$$

$\frac{11800}{43100}=\frac{118}{431}$, Hyde.

$$\begin{array}{llr}
\text{Tyler's stock,} & \$\,1200\times7= & 8400 \\
 & \underline{\phantom{\$\,1}300} & \\
 & \$\,1500\times3= & 4500 \\
 & \underline{\phantom{\$\,1}200} & \\
 & \$\,1700\times2= & \underline{3400} \\
 & & \$\,16300
\end{array}$$

$\frac{16300}{43100}=\frac{163}{431}$, Tyler.

$$\begin{array}{r}
\$\,15000 \\
11800 \\
\underline{16300} \\
\$\,43100
\end{array}$$

$\frac{\$\,1000\times150}{431}=\$\,348.02\frac{338}{431}$, Johnson's gain.

$\frac{\$\,1000\times118}{431}=\$\,273.78\frac{82}{431}$, Hyde's gain.

$\frac{\$\,1000\times163}{431}=\$\,378.19\frac{11}{431}$, Tyler's gain.

(4.)

The stock in trade is a horse and chaise to ride to Newburyport and back; the whole distance being 30 miles. The expense for the horse and chaise may be considered the "loss;" and the proportional part which each rode, the "time." Now, by the rule, each man is to bear his share of the loss (expense) in proportion as he has the use of the stock in trade (horse and chaise). Morse had the use of the whole stock in trade for the first 4 and last 4 miles, for which he must pay $\frac{8}{30} = \frac{4}{15}$ of \$ 3.00 = \$ 0.80. For the remaining part of the distance, 22 miles, the expense was $\frac{22}{30} = \frac{11}{15}$ of \$ 3.00 = \$ 2.20. Of this sum, Jones and Morse will pay equal parts = \$ 2.20 ÷ 2 = \$ 1.10. Morse will therefore pay \$ 0.80 + \$ 1.10 = \$ 1.90, and Jones \$ 1.10.

$\frac{4}{15} + \frac{11}{15} \times \frac{1}{2} = \frac{19}{30}$, Morse's product.
$\frac{11}{15} \times \frac{1}{2} = \frac{11}{30}$, Jones' product.
$\frac{30}{30}$, sum of the products.

$\frac{30}{30} : \frac{19}{30} :: \$\,3.00$
19
2700
300
30)5700(\$ 1.90 = Morse's share of the expense.
30
270
270
0

$\frac{30}{30} : \frac{11}{30} :: \$\,3.00$
11
30)3300(\$ 1.10 = Jones' share of the expense.
30
30
30
0

(5.)

As Jones' capital was invested 12 months and Cotton's but 9 months, Cotton's capital must be $\frac{12}{9}$ of Jones' capital.

9 months : 12 months : : \$ 1000 : \$ 1333.33⅓ Ans.

(6.)

$\$96 \div 8 = \$12$, S's gain in 1 mo. $\frac{12}{47}$ = S's share of stock.
$\$90 \div 6 = \$15$, C's gain in 1 mo. $\frac{15}{47}$ = C's share.
$\$80 \div 4 = \$\underline{20}$, D's gain in 1 mo. $\frac{20}{47}$ = D's share.
$\$47$ whole gain.

$$\left.\begin{array}{l}\$4700 \times \frac{12}{47} = \$1200, \text{ S's stock,}\\ \$4700 \times \frac{15}{47} = \$1500, \text{ C's stock,}\\ \$4700 \times \frac{20}{47} = \$2000, \text{ D's stock,}\end{array}\right\}\text{Ans.}$$

(7.)

$\$300 \times 7 = \$2100$ $\frac{2100}{8500} = \frac{21}{85}$, A's part.
$\$500 \times 8 = \$4000$ $\frac{4000}{8500} = \frac{8}{17}$, B's part.
$\$200 \times 12 = \$\underline{2400}$ $\frac{2400}{8500} = \frac{24}{85}$, C's part.
$\$8500$

$$\left.\begin{array}{l}\$85 \times \frac{21}{85} = \$21, \text{ A's gain,}\\ \$85 \times \frac{8}{17} = \$40, \text{ B's gain,}\\ \$85 \times \frac{24}{85} = \$24, \text{ C's gain,}\end{array}\right\}\text{Ans.}$$

(8.)

$\$10 \div 5 = \$2$, A's gain in 1 mo. $\frac{2}{5}$ = A's part of stock
$\$12 \div 4 = \$\underline{3}$, B's gain in 1 mo. $\frac{3}{5}$ = B's part.
$\$5$

$$\left.\begin{array}{l}\$500 \times \frac{2}{5} = \$200, \text{ A's stock,}\\ \$500 \times \frac{3}{5} = \$300, \text{ B's stock,}\end{array}\right\}\text{Ans.}$$

(9.)

$$\begin{array}{lcl}\$3000 \times 6 = \$18000 & \quad & \$6000 \times 8 = \$48000\\ \$\underline{2000} & & \$\underline{3000}\\ \$5000 \times 6 = \$\underline{30000} & & \$3000 \times 4 = \$\underline{12000}\\ \qquad\qquad\ \ \$48000, \text{ A.} & & \qquad\qquad\ \ \$60000, \text{ B.}\end{array}$$

$\$48000$ $\frac{48000}{108000} = \frac{4}{9}$, A's share.
$\underline{60000}$ $\frac{60000}{108000} = \frac{5}{9}$, B's share.
$\$108000$

$$\left.\begin{array}{l}\$1080 \times \frac{4}{9} = \$480, \text{ A's gain;}\\ \$1080 \times \frac{5}{9} = \$600, \text{ B's gain,}\end{array}\right\}\text{Ans.}$$

(10.)

$$\begin{aligned}
5\times 4 &= 20 & \tfrac{20}{150} &= \tfrac{2}{15},\ \text{A.}\\
6\times 8 &= 48 & \tfrac{48}{150} &= \tfrac{8}{25},\ \text{B.}\\
8\times 5 &= 40 & \tfrac{40}{150} &= \tfrac{4}{15},\ \text{C.}\\
3\times 14 &= \underline{42} & \tfrac{42}{150} &= \tfrac{7}{25},\ \text{D.}\\
 & \phantom{=}\ 150 & &
\end{aligned}$$

$$\left.\begin{aligned}
\$\,50\times\tfrac{2}{15} &= \$\ \ 6.66\tfrac{2}{3},\ \text{A's share,}\\
\$\,50\times\tfrac{8}{25} &= \$\,16.00,\ \ \text{B's share,}\\
\$\,50\times\tfrac{4}{15} &= \$\,13.33\tfrac{1}{3},\ \text{C's share,}\\
\$\,50\times\tfrac{7}{25} &= \$\,14.00,\ \ \text{D's share,}
\end{aligned}\right\}\text{Ans.}$$

(11.)

$$\begin{aligned}
30\times 50 &= 1500 & \tfrac{1500}{5910} &= \tfrac{50}{197},\ \text{A.}\\
50\times 36 &= 1800 & \tfrac{1800}{5910} &= \tfrac{60}{197},\ \text{B.}\\
58\times 45 &= \underline{2610} & \tfrac{2610}{5910} &= \tfrac{87}{197},\ \text{C.}\\
 & \phantom{=}\ 5910 & &
\end{aligned}$$

$$\$\,7500 - \$\,112.50 = \$\,7387.50.$$

$$\left.\begin{aligned}
\$\,7387.50\times\tfrac{50}{197} &= \$\,1875,\ \text{A receives,}\\
\$\,7387.50\times\tfrac{60}{197} &= \$\,2250,\ \text{B receives,}\\
\$\,7387.50\times\tfrac{87}{197} &= \$\,3262.50 + \$\,112.50 = \$\,3375,\ \text{C receives,}
\end{aligned}\right\}\text{Ans.}$$

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## REDUCTION OF CURRENCIES.

2. (**Art. 258**, p. **260.**) 144£. 7s. 6d. = 144.375£.; 144.375 ÷ $\frac{3}{10}$ = \$ 481.25 Ans.
3. 74£. 1s. 6d. = 74.075£.; 74.075 ÷ $\frac{2}{5}$ = \$185.18$\frac{3}{4}$ Ans.
4. 129 ÷ $\frac{3}{8}$ = \$ 344 Ans.
5. 84 ÷ $\frac{7}{30}$ = \$ 360 Ans.
6. 144£. 4s. = 144.20£.; 144.20 ÷ $\frac{1}{4}$ = 576.80 Ans.
7. 257£. 8s. 6d. = 257.425£.; 257.425 ÷ $\frac{25}{121}$ = \$ 1245.937 Ans.

2. (**Art. 259**, p. **261.**) 481.25 × $\frac{3}{10}$ = 144.375£. = 144£. 7s. 6d. Ans.
3. 185.18$\frac{3}{4}$ × $\frac{2}{5}$ = 74.075£. = 74£. 1s. 6d. Ans.

4. 344 × $\frac{3}{8}$ = 129£. Ans.
5. 360 × $\frac{7}{30}$ = 84£. Ans.
6. 576.50 × $\frac{1}{4}$ = 144.125£. = 144£. 2s. 6d. Ans.
7. 1245.937 × $\frac{25}{121}$ = 257.425£. = 257£. 8s. 6d. Ans.

1. (Art. **260**, p. **261**.) \$ .75 × 123 = \$ 92.25 Ans.
2. \$ 27.90 ÷ 186 = 150 francs, Ans.
3. \$ 0.69 × 121 = \$ 83.49 Ans.
4. 165.20 ÷ 40 = 413 florins, Ans.
5. \$ 1.48 × 216 = 319.68 Ans.
6. 5137.90 ÷ 10 = 51379 reals plate, Ans.

1. (Art. **263**, p. **262**.) 1 — .015 = .985; 452 × .985 = \$ 445.22 Ans.
2. \$ 1164 × 1.01 = 1175.64 Ans.
3. 1 — 0.025 = 0.975; \$ 400 × 0.975 = \$ 3900 Ans.
4. $\frac{5}{8}$ of 1 per cent = 0.00625; 1 — 0.00625 = 0.99375; \$ 450 × 0.99375 = \$ 447.18$\frac{3}{4}$ Ans.
5. $\frac{1}{8}$ of 1 per cent = 0.00125; 1 + .00125 = 1.00125; \$ 2517.70 × 1.00125 = \$ 2520.84+ Ans.

2. (Art. **266**, p. **264**.) 1£. + .085£. = 1.085£.; 1085 × $\frac{40}{9}$ = \$ 4.82$\frac{2}{9}$; 4.82$\frac{2}{9}$ × 572.5 = \$ 2760.72$\frac{2}{9}$ Ans.
3. 1200£. × 1.0925 = 1311£.; 1311 × $\frac{40}{9}$ = \$ 5826.66$\frac{2}{3}$ Ans.

2. (Art. **267**, p. **265**.) 1£. + .085£. = 1.085£.; 1.085 × $\frac{40}{9}$ = \$ 4.82$\frac{2}{9}$; 1640 ÷ 4.82$\frac{2}{9}$ = 340£. 1s. 10d. Ans.
3. 1£. + .10£. = £1.10; 1.10 × $\frac{40}{9}$ = \$ 4.96$\frac{8}{9}$; 500 ÷ 4.96$\frac{8}{9}$ = 102£. 5s. 5d. Ans.

1. (Art. **269**, p. **265**.) 2380 ÷ 5.15 = \$ 462.13+ Ans.
2. 30000 ÷ 5.175 = \$ 5797.10+ Ans.
3. 62500 ÷ 5.12 = \$ 12207.03+ Ans.

1. (Art. **270**, p. **266**.) 2500 × 5.12 = 12800 francs, Ans.
2. 700 × 5.13 = 3591 francs, Ans.
3. 675 × 5.16 = 3483 francs, Ans.

## DUODECIMALS.

### (Art. 272, p. 267.)

(1.)

| ft. | ′ | ″ |
|---|---|---|
| 12 | 6 | 9 |
| 14 | 7 | 8 |
| 165 | 11 | 10 |
| 193 | 2 | 3 |

(2.)

| ft. | ′ | ″ | ‴ |
|---|---|---|---|
| 182 | 11 | 2 | 4 |
| 127 | 7 | 8 | 11 |
| 291 | 5 | 11 | 10 |
| 602 | 0 | 11 | 1 |

(3.)

| ft. | ′ | ″ |
|---|---|---|
| 204 | 7 | 9 |
| 114 | 10 | 6 |
| 89 | 9 | 3 |

(4.)

| ft. | ′ | ″ | ‴ | ⁗ |
|---|---|---|---|---|
| 397 | 9 | 6 | 11 | 7 |
| 201 | 11 | 7 | 8 | 10 |
| 195 | 9 | 11 | 2 | 9 |

### (Art. 274, p. 268.)

(2.)

| ft. | ′ | |
|---|---|---|
| 8 | 3 | |
| 7 | 9 | |
| 57 | 9 | |
| 6 | 2 | 3 |
| 63 | 11 | 3 |

(3.)

| ft. | ′ | |
|---|---|---|
| 12 | 9 | |
| 9 | 11 | |
| 114 | 9 | |
| 11 | 8 | 3 |
| 126 | 5 | 8 |

(4.)

18 + 10 × 2 × 16½ = 924ft., distance round the garden; 2ft. + 1ft. 6in. = 3ft. 6in., width of new ditch; 3ft. + 1ft. = 4ft., depth of new ditch; 3ft. 6in. × 4 = 14ft.; 924ft. + 14ft. = 938ft., length of the new ditch; 3ft. 6in. × 4 × 938 = 13132, contents of the new ditch. As the ditch is 2ft. wide, there must be added 2ft. × 4 = 8ft. to the distance round the garden, to obtain the entire length of the ditch, 924ft. + 8ft. = 932ft.; 932ft. × 3 × 2 = 5592 cubic feet, in the old ditch; 13132ft. — 5592ft. = 7540 cubic feet, Ans.

(5.)

| ft. | ft. | in. | ft. | in. | ft. | |
|---|---|---|---|---|---|---|
| 12 | 6 | 6 | 5 | 6 | 12 | |
| 11 | 2 | 6 | 3 | 6 | 11 | |
| 23 | 13 | 0 | 16 | 6 | 23 | |
| 2 | 3 | 3 | 2 | 9 | 2 | |
| 46 | 16 | 3 | 19 | 3 | 46 | |
| $7\frac{1}{2}$ | | 2 | | 3 | 5 | |
| 322 | 32 | 6 | 57 | 9 | 41 | 0 |
| 23 | | | 32 | 6 | | 8 |
| 9)345 | | | 27 | 4 | 27 | 4 |
| $38\frac{1}{3}$ | | | 9)117 | 7 | | |
| $13\frac{7}{108}$ | | | $13\frac{7}{108}$ | | | |
| $25\frac{29}{108}$yd. Ans. | | | | | | |

(Art. **275**, p. **269**.)

**2.** 1ft. $\overset{\prime}{9}$)22ft. $\overset{\prime}{2}$(12ft. 8in. **Ans.**

$$\begin{array}{rrr} 21 & 0 & \\ \hline 1 & 2 & \overset{\prime\prime}{0} \\ 1 & 2 & 0 \\ \hline \end{array}$$

3. $17 \times 128 = 9600$ft.

$$\begin{array}{rrl} 256\text{ft.} & \overset{\prime}{0} & \\ 4 & 6 & \\ \hline 1024 & 0 & \\ 128 & 0 & \\ \hline 1152 & 0) & 9600\text{ft.}\ \ \overset{\prime}{0}(8\text{ft. } 4\text{in. Ans.} \\ & & 9216 \\ \hline & & \ \ 384\ \ \ \overset{\prime}{0} \\ & & \ \ 384\ \ \ \overset{\prime}{0} \\ \hline \end{array}$$

## INVOLUTION.

(Art. **277**, p. **270**.)

1. $6 \times 6 = 36$ Ans.
2. $5 \times 5 \times 5 = 125$ Ans.
3. $4 \times 4 \times 4 \times 4 \times 4 \times 4 =$ 4096 Ans.
4. $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{81}$ Ans.
5. $\frac{11}{3} \times \frac{11}{3} \times \frac{11}{3} \times \frac{11}{3} \times \frac{11}{3} = \frac{161051}{243} = 662\frac{185}{243}$ Ans.
6. $.25 \times .25 \times .25 = .015625$ Ans.
7. 17 Ans.

2. (Art. **278**, p. **271**.) $\overset{1}{5}, \overset{2}{25}, \overset{3}{125};\ \overset{3}{125} \overset{+}{\times} \overset{2}{25} \overset{+}{\times} \overset{2}{25} \overset{=}{=} \overset{7}{78125}$ [Ans.

3. $\overset{1}{6}, \overset{2}{36}, \overset{3}{216};\ \overset{3}{216} \overset{+}{\times} \overset{3}{216} \overset{+}{\times} \overset{3}{216} \overset{=}{=} \overset{9}{10077696}$ Ans.

4. $\overset{1}{7}, \overset{2}{49}, \overset{3}{343}, \overset{4}{2401};\ \overset{4}{2401} \overset{+}{\times} \overset{3}{343} \overset{+}{\times} \overset{3}{343} \overset{+}{\times} \overset{2}{49} \overset{=}{=} \overset{12}{13841287201}$ [Ans.

5. $\overset{1}{8}, \overset{2}{64}, \overset{3}{512};\ \overset{3}{512} \overset{+}{\times} \overset{3}{512} \overset{+}{\times} \overset{2}{64} \overset{=}{=} \overset{8}{16777216}$ Ans.

6. $\overset{1}{4}, \overset{2}{16}, \overset{3}{64}, \overset{4}{256}, \overset{5}{1024}; \overset{5}{1024} \overset{+}{\times} \overset{5}{1024} \overset{=}{=} \overset{10}{1048576} \overset{+}{\times} \overset{10}{1048576}$
$\overset{=}{=} \overset{20}{1099511627776}$ Ans.

7. $\overset{1}{3}, \overset{2}{9}, \overset{3}{27}, \overset{4}{81}, \overset{5}{243}, \overset{6}{729}, \overset{7}{2187}, \overset{8}{6561}, \overset{9}{19683}, \overset{10}{59049}; \overset{10}{59049} \overset{+}{\times}$
$\overset{10}{59049} \overset{+}{\times} \overset{10}{59049} \overset{=}{=} \overset{30}{205891132094649}$ Ans.

## EXTRACTION OF THE SQUARE ROOT.

(ART. 281, p. 275.)

(3.)
$5\dot{1}6\dot{9}6\dot{1}(719$
49
141)269
141
1429)12861
12861

(4.)
$1\dot{8}2\dot{3}2\dot{9}(427$
16
82)223
164
847)5929
5929

(5.)
$2\dot{3}8\dot{0}4\dot{6}4\dot{1}(4879$
16
88)780
704
967)7646
6769
9749)87741
87741

(6.)
$1\dot{0}6\dot{7}3\dot{2}8\dot{9}(3267$
9
62)167
124
646)4332
3876
6527)45689
45689

(7.)
$2\dot{0}8\dot{9}4\dot{0}4\dot{1}(4571$
16
85)489
425
907)6440
6349
9141)9141
9141

(8.)
$\dot{4}2\dot{0}2\dot{5}(205$
4
405)2025
2025

(9.)

$\dot{1}0\dot{1}4\dot{0}4\dot{9}(1007$

1

2007)014049

014049

(10.)

$\dot{5}3\dot{8}(23.194+$

4

43)138

129

461)900

461

4629)43900

41661

46384)223900

185536

38364

(11.)

$7\dot{1}(8.426+$

64

164)700

656

1682)4400

3364

16846)103600

101076

2524

(12.)

$\dot{7}(2.645+$

4

46)300

276

524)2400

2096

5285)30400

26425

3975

(13.)

$.1\dot{0}2\dot{4}(.32$

9

62)124

124

(14.)

$.3\dot{3}6\dot{4}(.58$

25

108)864

864

(15.)

$.8\dot{9}5\dot{0}(.946+$

81

184)850

736

1886)11400

11316

84

(16.)

$.1\dot{2}0\dot{4}0\dot{9}(.347$

9

64)304

256

687)4809

4809

(17.)

$6\dot{1}7\dot{2}3\dot{0}2\dot{0}.9\dot{6}$(7856.4
49
148)1272
1184
1565)8830
7825
15706)100520
94236
157124)628496
628496

(18.)

$9\dot{7}5\dot{4}.6\dot{0}4\dot{2}3\dot{7}1\dot{6}$(98 7654
81
188)1654
1504
1967)15060
13769
19746)129142
118476
197525)1066637
987625
1975304)7901216
7901216

(ART. 282, p. 275.)

(1.)

$\sqrt{\frac{49}{529}}$

$4\dot{9}$(7
49

$\dot{5}2\dot{9}$(23
4
43)129
129
$\frac{7}{23}$ Ans.

(2.)

$\sqrt{\frac{196}{625}}$

$\dot{1}9\dot{6}$(14
1
24)96
96

$\dot{6}2\dot{5}$(25
4
45)225
225
$\frac{14}{25}$ Ans.

(3.)

$\sqrt{\frac{3721}{7569}}$

$3\dot{7}2\dot{1}$(61
36
121)121
121

$7\dot{5}6\dot{9}$(87
64
167)1169
1169
$\frac{61}{87}$ Ans.

(4.)

$\sqrt{\frac{1849}{12769}}$

$1\dot{8}4\dot{9}$(43
16
83)249
249

$\dot{1}2\dot{7}6\dot{9}$(113
1
21)27
21
223)669
669
$\frac{43}{113}$ Ans.

(5.)

$60\frac{1}{16}=\frac{961}{16}$

$\dot{9}6\dot{1}(31$

9

61)61

61

$1\dot{6}(4$

16

$\frac{31}{4}=7\frac{3}{4}$ Ans.

(6.)

$28\frac{57}{64}=\frac{1849}{64}$

$1\dot{8}4\dot{9}(43$

16

83)249

249

$6\dot{4}(8$

64

$\frac{43}{8}=5\frac{3}{8}$ Ans.

(7.)

$47\frac{17}{64}=\frac{3025}{64}$

$\dot{3}02\dot{5}(55$

25

105)525

525

$6\dot{4}(8$

64

$\frac{55}{8}=6\frac{7}{8}$.

(8.)

$\frac{42}{57}=.7\dot{3}6\dot{8}4\dot{2}+(.858+$

64

165)968

825

1708)14342

13664

678

(9.)

$83\frac{2}{3}=8\dot{3}.6\dot{6}6\dot{6}+(9.14+$

81

181)266

181

1824)8566

7296

1270

(10.)

$121\frac{17}{18}=\dot{1}2\dot{1}.9\dot{4}4\dot{4}4\dot{4}+(11.042+$

1

21)21

21

2204)9444

8816

22082)62844

44164

18680

(11.)

$\frac{339\frac{3}{7}}{462}=\frac{2376}{3234}=\frac{36}{49};\ \sqrt{\frac{36}{49}}=\frac{6}{7}$ Ans

(12.)

$\frac{76\frac{12}{13}}{1557\frac{9}{13}}=\frac{1000}{20250}=\frac{4}{81};\ \sqrt{\frac{4}{81}}=\frac{2}{9}$.

## APPLICATION OF THE SQUARE ROOT.

(ART. 283, p. 276.)

1. $\sqrt{226576} = 476$ Ans.
2. 640 acres $= 102400$ rods; $\sqrt{102400} = 320$ rods, Ans.
3. $125 \times 53 = 6625$rd.; $62\frac{1}{2} \times 34 = 2125$rd.; $37 \times 160 = 5920$rd.; $6625 + 2125 + 5920 = 14670$rd.; $\sqrt{14670} = 121.11+$ rods, Ans.
4. $242 \times 242 = 58564$ feet, area of the first lot; $58564 \times 9 = 527066$; $\sqrt{527076} = 726$ feet, Ans.
5. 124A. $\times 160 = 19840$ rods, area of the former pasture; $4 : 5 :: 19840 : 24800$, area of the latter; $\sqrt{24800} = 157.48+$rd. Ans.
6. $2 : 3 :: 216 : 324$; $\sqrt{324} = 18$ trees in length; $3 : 2 :: 216 : 144$; $\sqrt{144} = 12$ trees in breadth; $18 - 1 = 17$; $17 \times 25 = 425$ft.; $12 - 1 = 11$; $11 \times 25 = 275$ft.; $425 \times 275 = 116875$ sq. ft. Ans.

1. (ART. 288, p. 277.) $40 \times 40 = 1600$; $9 \times 9 = 81$; $1600 + 81 = 1681$; $\sqrt{1681} = 41$ft. Ans.
2. $360 \times 360 = 129600$; $450 \times 450 = 202500$; $129600 + 202500 = 332100$; $\sqrt{332100} = 576.2+$ miles, Ans.
3. $60 \times 60 = 3600$ft.; $36 \times 36 = 1296$ft.; $3600 - 1296 = 2304$ft.; $\sqrt{2304} = 48$ feet, Ans.
4. $120 \times 120 = 14400$ft.; $50 \times 50 = 2500$ft.; $14400 - 2500$ 11900ft.; $\sqrt{11900} = 109.08+$ feet, Ans.
5. $160 + 20 = 180$; $180 \times 180 = 32400$; $500 \times 500 = 250000$; $250000 - 32400 = 217600$; $\sqrt{217600} = 466.47+$; $466.47+ - 100 = 366.47+$ feet, Ans.
6. $110 + 90 = 200$; $300 \times 300 = 90000$; $200 \times 200 = 40000$; $90000 - 40000 = 50000$; $\sqrt{50000} = 223.6+$ft.; $223.6+ - 160 = 63.6+$ feet, Ans.
7. $60 \times 60 = 3600$; $80 \times 80 = 6400$; $3600 + 6400 = 10000$, $\sqrt{10000} = 100$; $70 \times 70 = 4900$; $4900 + 6400 = 11300$; $\sqrt{11300} = 106.3+$; $90 \times 90 = 8100$; $8100 + 4900 = 13000$; $\sqrt{13000} = 114.01+$; $8100 + 3600$

$= 11700$; $\sqrt{11700} = 108.16+$; $100 + 106.3 + 114.01 + 108.16 = 428.47+$ rods, Ans.

3. $24 \times 24 = 576$ft.; $18 \times 18 = 324$ft.; $12 \times 12 = 144$; $576 + 324 + 144 = 1044$ft.; $\sqrt{1044} = 32.3+$ feet, Ans.

2. (Art. **292**, p. **279**.) $2 : 1 :: 16^2 : 128$; $\sqrt{128} = 11.31+$ feet, Ans.
3. $1 : 3 :: 11^2 : 363$; $\sqrt{363} = 19.05+$ rods, Ans.
4. $28.3 : 42.5 :: 6^2 : 54.06+$; $\sqrt{54.06+} = 7.35+$ feet, Ans.
5. $2000 : 4000 :: 3^2 : 18$; $\sqrt{18} = 4.24+$ inches, Ans.
6. $1000 : 5000 :: 4^2 : 80$; $\sqrt{80} = 8.94+$ inches, Ans.
7. $12^2 : 8^2 :: 72 : 32$ rods, Ans.
8. $45^2 : 15^2 :: 950 : 105.55+$ square rods, Ans.
9. $6^2 : 9^2 :: 1.178+ : 2.65+$ feet, Ans.
10. $3^2 : 2^2 :: 20\frac{1}{4} : 9$ minutes, Ans.
11. $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$; $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$; $\frac{9}{16} - \frac{1}{9} = \frac{65}{144}$; $\frac{65}{144} : \frac{9}{16} :: 50 : 62\frac{4}{13}$ minutes, Ans.

1. (Art. **293**, p. **280**.) $12^2 = 144$; $144 \div 2 = 72$; $\sqrt{72} = 8.48+$ feet, Ans.
2. $30^2 = 900$; $900 \div 2 = 450$; $\sqrt{450} = 21.2+$ inches square, Ans.
3. $1.5 \times 1.5 = 2.25$; $2.25 \div 2 = 1.1250$; $\sqrt{1.1250} = 1.06+$ inches, Ans.

---

## EXTRACTION OF THE CUBE ROOT.

(Art. **295**, p. **284**.)

(2.)

$7\dot{4}08\dot{8}(42$

$64$

$4^2 \times 300 = 4800)10088$

$4800 \times 2 = 9600$

$2^2 \times 30 \times 4 = 480$

$2 \times 2 \times 2 = 8$

$10088$

(3.)

$18\dot{5}19\dot{3}(57$

$125$

$5^2 \times 300 = 7500)60193$

$7500 \times 7 = 52500$

$7^2 \times 30 \times 5 = 7350$

$7 \times 7 \times 7 = 343$

$60193$

(4.)

$$\begin{array}{rr}
 & 8\dot{0}62\dot{1}56\dot{8}(432 \\
 & 64 \\ \cline{2-2}
4^2\times300=4800) & 16621 \\ \cline{2-2}
4800\times3= & 14400 \\
3^2\times30\times4= & 1080 \\
3\times3\times3= & 27 \\ \cline{2-2}
 & 15507 \\ \cline{2-2}
43^2\times300=554700) & 1114568 \\ \cline{2-2}
554700\times2= & 1109400 \\
2^2\times30\times43= & 5160 \\
2\times2\times2= & 8 \\ \cline{2-2}
 & 1114568
\end{array}$$

(5.)

$$\begin{array}{rr}
 & 17\dot{6}55\dot{8}48\dot{1}(561 \\
 & 125 \\ \cline{2-2}
5^2\times300=7500) & 51558 \\ \cline{2-2}
7500\times6= & 45000 \\
6^2\times30\times5= & 5400 \\
6\times6\times6= & 216 \\ \cline{2-2}
 & 50616 \\ \cline{2-2}
56^2\times300=940800) & 942481 \\ \cline{2-2}
940800\times1= & 940800 \\
1^2\times30\times56= & 1680 \\
1\times1\times1= & 1 \\ \cline{2-2}
 & 942481
\end{array}$$

(6.)

$$\begin{array}{rr}
 & 25\dot{7}25\dot{9}45\dot{6}(636 \\
 & 216 \\ \cline{2-2}
6^2\times300=10800) & 41259 \\ \cline{2-2}
10800\times3= & 32400 \\
3^2\times30\times6= & 1620 \\
3\times3\times3= & 27 \\ \cline{2-2}
 & 34047 \\ \cline{2-2}
63^2\times300=1190700) & 7212456 \\ \cline{2-2}
1190700\times6= & 7144200 \\
6^2\times30\times63= & 68040 \\
6\times6\times6= & 216 \\ \cline{2-2}
 & 7212456
\end{array}$$

(7.)

$$\begin{array}{rr}
 & \dot{1}86\dot{0}86\dot{7}(123 \\
 & 1 \\ \cline{2-2}
1^2\times300=300) & 860 \\ \cline{2-2}
300\times2= & 600 \\
2^2\times30\times1= & 120 \\
2\times2\times2= & 8 \\ \cline{2-2}
 & 728 \\ \cline{2-2}
12^2\times300=43200) & 132867 \\ \cline{2-2}
43200\times3= & 129600 \\
3^2\times30\times12= & 3240 \\
3\times3\times3= & 27 \\ \cline{2-2}
 & 132867
\end{array}$$

(8.)

$\dot{1}87\dot{9}08\dot{0}90\dot{4}(1234$
$1$
$1^2 \times 300 = 300)879$

$300 \times 2 = 600$
$2^2 \times 30 \times 1 = 120$
$2 \times 2 \times 2 = \underline{\phantom{00}8}$
$728$

$12^2 \times 300 = 43200)151080$

$43200 \times 3 = 129600$
$3^2 \times 30 \times 12 = 3240$
$3 \times 3 \times 3 = \underline{\phantom{000}27}$
$132867$

$123^2 \times 300 = 4538700)18213904$

$4538700 \times 4 = 18154800$
$4^2 \times 30 \times 123 = 59040$
$4 \times 4 \times 4 = \underline{\phantom{0000}64}$
$18213904$

(9.)

$4\dot{1}67\dot{3}64\dot{8}.56\dot{3}(346.7$
$27$
$3^2 \times 300 = 2700)14673$

$2700 \times 4 = 10800$
$4^2 \times 30 \times 3 = 1440$
$4 \times 4 \times 4 = \underline{\phantom{00}64}$
$12304$

$34^2 \times 300 = 346800)2369648$

(Carried forward.)

(Brought forward.)

$34^2 \times 300 = 346800)\underline{2369648}$

$346800 \times 6 = 2080800$

$6^2 \times 30 \times 34 = 36720$

$6 \times 6 \times 6 = \underline{216}$

$\underline{2117736}$

$346^2 \times 300 = 35914800)\underline{251912563}$

$35914800 \times 7 = 251403600$

$7^2 \times 30 \times 346 = 508620$

$7 \times 7 \times 7 = \underline{343}$

$251912563$

(10.)

$48\dot{3}92\dot{1}.51\dot{6}05\dot{1}(78.51$

$\underline{343}$

$7^2 \times 300 = 14700)\underline{140921}$

$14700 \times 8 = 117600$

$8^2 \times 30 \times 7 = 13440$

$8 \times 8 \times 8 = \underline{512}$

$\underline{131552}$

$78^2 \times 300 = 1825200)\underline{9369516}$

$1825200 \times 5 = 9126000$

$5^2 \times 30 \times 78 = 58500$

$5 \times 5 \times 5 = \underline{125}$

$\underline{9184625}$

$785^2 \times 300 = 184867500)\underline{184891051}$

$184867500 \times 1 = 184867500$

$1^2 \times 30 \times 785 = 23550$

$1 \times 1 \times 1 = \underline{1}$

$184891051$

(ART. **296**, p. **285.**)

(1.)

$81\frac{5}{11} = \quad 8\dot{1}.45\dot{4}545\dot{4}5\dot{4}(4.334+$

$\underline{64}$

$4^2 \times 300 = 4800)\underline{17454}$

$4800 \times 3 = 14400$

$3^2 \times 30 \times 4 = \phantom{0}1080$

$3 \times 3 \times 3 = \underline{\phantom{000}27}$

$\underline{15507}$

$43^2 \times 300 = 554700)\underline{1947545}$

$554700 \times 3 = 1664100$

$3^2 \times 30 \times 43 = \phantom{00}11610$

$3 \times 3 \times 3 = \underline{\phantom{00000}27}$

$\underline{1675737}$

$433^2 \times 300 = 56246700)\underline{271808454}$

$56246700 \times 4 = 224986800$

$4^2 \times 30 \times 433 = \phantom{000}255840$

$4 \times 4 \times 4 = \underline{\phantom{0000000}64}$

$\underline{225242704}$

$46565750$

(2.)

$\sqrt[3]{\frac{729}{4096}} = \frac{9}{16}$ Ans.

$72\dot{9}(9$

$\underline{729}$

$\dot{4}09\dot{6}(16$

$1$

$1^2 \times 300 = 300)\overline{3096}$

$300 \times 6 = 1800$

$6^2 \times 30 \times 1 = 1080$

$6 \times 6 \times 6 = \underline{\phantom{0}216}$

$3096$

(3.)

$49\frac{8}{27} = \frac{1331}{27};$

$\sqrt[3]{\frac{1331}{27}} = \frac{11}{3} = 3\frac{2}{3}$ Ans.

$\dot{1}33\dot{1}(11$

$1$

$1^2 \times 300 = 300)\overline{331}$

$300 \times 1 = 300$

$1^2 \times 30 \times 1 = \phantom{0}30$

$1 \times 1 \times 1 = \underline{\phantom{00}1}$

$331$

$2\dot{7}(3$

$27$

(4.)

$166\frac{3}{8} = \frac{1331}{8}$;

$\sqrt[3]{\frac{1331}{8}} = \frac{11}{2} = 5\frac{1}{2}$ Ans.

$$\begin{array}{rrr}
 & \dot{1}33\dot{1})11 & \dot{8}(2 \\
 & \underline{1\phantom{000}} & 8 \\
1^2 \times 300 = & 300)\underline{331} & \\
300 \times 1 = & 300 & \\
1^2 \times 30 \times 1 = & 30 & \\
1 \times 1 \times 1 = & \underline{1} & \\
 & 331 &
\end{array}$$

(5.)

$85\frac{23}{125} = \frac{10648}{125}$;

$\sqrt[3]{\frac{10648}{125}} = \frac{22}{5} = 4\frac{2}{5}$ Ans.

$$\begin{array}{rrr}
 & 1\dot{0}64\dot{8})22 & \\
 & \underline{8\phantom{000}} & \\
2^2 \times 300 = & 1200)\underline{2648} & \\
1200 \times 2 = & 2400 & \\
2^2 \times 30 \times 2 = & 240 & 12\dot{5}(5 \\
2 \times 2 \times 2 = & \underline{8} & \underline{125} \\
 & 2648 &
\end{array}$$

1. (**Art. 297**, p. **285.**) $\sqrt[3]{2744} = 14$ feet, Ans.

2. $268\frac{4}{5} \times 8 = 2150\frac{2}{5}$ cubic inches in 1 bushel; $2150\frac{2}{5} \times 400 = 860160$ cubic inches $= 497\frac{7}{9}$ cubic feet in 400 bushels; $\sqrt[3]{497.777+}$ft. $= 7.92+$ft. Ans.

3. $18 \times 15 \times 10 = 2700$ft.; $\sqrt[3]{2700}$ft. $= 13.92+$ft. Ans.

2. (**Art. 302**, p. **286.**) $2^3 = 8 : 12^3 = 1728 :: \$6.25 . \$1350$ Ans.

3. $4^3 = 64 : 6^3 = 216 :: 50 : 168.7+$lb. Ans.

4. $16 : 8 :: 12^3 = 1728 : 864$; $\sqrt[3]{864} = 9.5+$; $12 - 9.5+ = 2.5+$in. Ans.

5. $6^3 = 216 : 7^3 = 343 :: 800 : 1270.3+$lb. Ans.

6. $1^3 : 2^3 = 8 :: 1 : 8$ cords, Ans.

7. $30^3 = 27000 : 40^3 = 64000 :: 1000 : 2370.3+$lb. Ans.

8. $6^3 = 216 : 12^3 = 1728 :: 16 : 128$ ounces, Ans.

9. $15^3 = 3375$; $3375 \times \frac{2}{3} = 2250$; $\sqrt[3]{2250} = 13.1+$ feet. Ans.

## ARITHMETICAL PROGRESSION.

2. (**Art. 304**, p. **288.**) $\frac{55 - 7}{17 - 1} = 3$ Ans.

3. $\frac{14 - 4}{15 - 1} = \frac{10}{14} = \frac{5}{7}$ Ans.

4. $\frac{17 - 9}{10 - 1} = \frac{8}{9}$ miles, Ans.

2. (Art. **305**, p. **289**.) $\$\,\overline{51 + \$\,7} \times 6 = \$\,348$ Ans.

3. $\frac{198 \times 99}{2} = 9801$ rods, Ans.

2. (Art. **306**, p. **290**.) $\frac{\overline{47 - 8}}{3} + 1 = 14$ days, Ans.

(Art. **307**, p. **291**.)

2. $\frac{\overline{137 - 12}}{5} + 1 = 26$; $\frac{\overline{137 + 12} \times 26}{2} = 1937$ lines, Ans.

2. (Art. **308**, p. **292**.) $\overline{12 - 1} \times 2 + 7 = 29$ miles, Ans.

3. $\overline{10 - 1} \times 1\frac{1}{2} = 13\frac{1}{2}$; $20\frac{1}{4} - 13\frac{1}{2} = 6\frac{3}{4}$ miles, Ans.

2. (Art. **310**, p. **293**.) $\overline{(6 - 1) \times \$\,15} + \$\,250 = \$\,325$; $\overline{250 + 325} \times 3 = \$\,1725$ Ans.

3. $\overline{(10 - 1) \times \$\,19} + \$\,380 = \$\,551$; $\overline{551 + 380} \times 5 = \$\,4655$ Ans.

4. $\overline{(8 - 1) \times \$\,49.50} + \$\,825 = \$\,1171.50$; $\overline{1171.50 + 825} \times 4 = \$\,7986$ Ans.

5. $\$\,100 \times .08 \times 2\frac{1}{2} = \$\,20$; $\$\,100 \times .08 \times 2 = \$\,16$;
$\$\,100 \times .08 \times 1\frac{1}{2} = \$\,12$; $\$\,100 \times .08 = \$\,8$;
$\$\,100 \times .04 = \$\,4$; $\$\,200 \times 3 = \$\,600$;
$\$600 + \$\,20 + \$\,16 + \$\,12 + \$\,8 + \$\,4 = \$\,660$ Ans.

6. $\overline{(8 - 1) \times \$\,42} + \$\,700 = \$\,994$; $\overline{994 + 700} \times 4 = \$\,6776$; $\$\,6776 - \$\,100 = \$\,6676$ Ans.

7. $\overline{(12 - 1) \times \$\,0.50} + \$\,50 = \$\,55.50$; $\overline{55.50 + 50} \times 6 = \$\,633$ Ans.

## GEOMETRICAL PROGRESSION.

2. (Art. **312**, p. **295**.) $5^6 = 15625$; $15625 \times 4 = 62500$ Ans

3. $\frac{1}{4}^6 = \frac{1}{4096}$; $\frac{1}{4096} \times 28672 = \frac{28672}{4096} = 7$ Ans.

4. $4^7 = 16384$; $16384 \times 5 = 81920$ Ans.

5. $20^4 = 160000$; $160000 \times 10 = 1600000$ Ans.

6. $1.06^5 = 1.3382255776$; $1.3382255776 \times 30 = 40.146767328$ Ans.

7. $1.06^5 = 1.3382255776$; $1.3382255776 \times \$\,1728 = \$\,2312.453798+$ Ans.

8. $105^4 = 1.21550625$; $1.21550625 \times \$\,328.90 = \$\,399.78+$ Ans.

9. $3^{14} = 4782969$; $4782969 \times \$\,0.05 = \$\,239148.45$ Ans.

3. (**Art. 313, p. 297.**) $\frac{4^7 - 1}{4 \ - 1} \times 8 = 43688$ Ans.

4. $\frac{1 - \frac{3}{4}^5}{1 - \frac{3}{4}} \times 10 = \frac{7810}{256} = 30\frac{65}{128}$ Ans.

5. $\frac{1.06^4 - 1}{1.06 \ - 1} \times 18 = 78.743+$ Ans.

6. $\frac{1.05^5 - 1}{1.05 \ - 1} \times \$\,144 = \$\,795.6909$ Ans.

7. $1\frac{2}{3} = \frac{5}{3}$; $\frac{\frac{5}{3}^6 - 1}{\frac{5}{3} \ - 1} = \frac{7448}{81} = \$\,91\frac{77}{81}$ Ans.

8. $\frac{6^4 - 1}{6 \ - 1} \times 2 = 518$ Ans.

9. $\frac{4^{10} - 1}{4 - 1} \times \$\,0.01 = \$\,3495.25$ Ans.

2. (**Art. 315, p. 299.**) $\frac{1.05^4 - 1}{1.05 \ - 1} \times \$\,1728 = 7447.89,6+$ Ans.

3. $\frac{1.06^7 - 1}{1.06 \ - 1} \times \$\,87 = \$\,730.26,3+$ Ans.

4. $\frac{1.06^6 - 1}{1.06 \ - 1} \times \$\,500 = \$\,3487.65,9+$ Ans.

5. $\frac{1.06^{10} - 1}{1.06 \ - 1} \times \$\,96 = \$\,1265.35,6+$ Ans.

6. $\frac{1.06^3 - 1}{1.06 \ - 1} \times \$\,1000 = \$\,3183.60$ Ans.

7. $\frac{1.06^8 - 1}{1.06 \ - 1} \times \$\,56 = \$\,470.05,4+$ Ans.

8. $\frac{1.05^7 - 1}{1.05 \ - 1} \times \$\,25 = \$\,203.55$; $\frac{1.06^{10} - 1}{1.06 - 1} \times \$\,20 =$

\$ 263.61,5+ ; \$ 263.61,5 — \$ 203.55 = \$ 60.06,5+, William receives more than Samuel, Ans

9. $\frac{1.05^{14} - 1}{1.05 - 1} \times \$\,10 = \$\,195.98,6+$ Ans.

## ALLIGATION.

(Art. 318, p. 300.)

(2.)

$\$\,0.20 \times 30 = \$\,6.00$
$\$\,0.25 \times 40 = \$\,10.00$
$\$\,0.30 \times 70 = \$\,21.00$
$\$\,0.40 \times \underline{80} = \$\,\underline{32.00}$
220gal. \$ 69.00
$\$\,69 \div 220 = \$\,0.31\frac{4}{11}$ Ans.

(3.)

$\$\,0.40 \times 4 = \$\,1.60$
$\$\,0.85 \times 8 = \$\,6.80$
$\$\,1.00 \times 12 = \$\,12.00$
$\$\,1.50 \times \underline{10} = \$\,\underline{15.00}$
34bu. \$ 35.40
$\$\,35.40 \div 34 = \$\,1.04\frac{2}{17}$ Ans.

(Art. 320, p 303.)

(3.)

$$42\left\{\begin{array}{l} 25 \\ 30 \\ 40 \\ 50 \end{array}\right. \quad \left.\begin{array}{l} 8 \\ 8 \\ 8 \\ 17 + 12 + 2 = 31 \end{array}\right\} \text{Ans.}$$

(Art. 321, p. 303.)

(2.)

$$1.25\left\{\begin{array}{r} 50 \\ 60 \\ 1.50 \\ 1.70 \end{array}\right. \quad \left.\begin{array}{ll} 45 & 75 : 45 :: 30 : 18\text{bu. of oats,} \\ 25 & 75 : 25 :: 30 : 10\text{bu. of peas,} \\ 65 & 75 : 65 :: 30 : 26\text{bu. of beans,} \\ 75 & \end{array}\right\} \text{Ans.}$$

(3.)

$.10 \times 1.25 = .12\frac{1}{2}$
$.12 \times 1.25 = .15$
$.15 \times 1.25 = .18\frac{3}{4}$

$$14\left\{\begin{array}{l} 12\frac{1}{2} \\ 15 \\ 18\frac{3}{4} \end{array}\right. \quad \begin{array}{l} 1 + 4\frac{3}{4} = 5\frac{3}{4} \\ 1\frac{1}{2} \\ 1\frac{1}{2} \end{array} \quad \left.\begin{array}{l} 1\frac{1}{2} : 5\frac{3}{4} :: 100 : 383\frac{1}{3}\text{lb.} \\ 1\frac{1}{2} : 1\frac{1}{2} :: 100 : 100\text{lb.} \end{array}\right\} \text{Ans.}$$

(**Art. 322, p. 304.**)

(2.)

$$1.80\left\{\begin{array}{l}0.00\\2.00\\2.50\end{array}\right. \qquad \begin{array}{r}.70+.20=\ .90\\1.80\\\underline{1.80}\\4.50\end{array}$$

$$\left.\begin{array}{l}4.50 : \ .90 :: 100 : 20 \text{ bushels of chaff,}\\4.50 : 1.80 :: 100 : 40 \text{ bushels of wheat,}\\4.50 : 1.80 :: 100 : 40 \text{ bushels of rye,}\end{array}\right\}\text{Ans.}$$

(3.)

$$\begin{array}{l}.20\times1.10=.22\\.30\times1.10=.33\end{array}\ 25\left\{\begin{array}{l}22\\33\end{array}\right. \begin{array}{r}8\\\underline{3}\\11\end{array}\ \left.\begin{array}{l}11:8::80:58\tfrac{2}{11}\text{gal.}\\11:3::80:21\tfrac{9}{11}\text{gal.}\end{array}\right\}\text{Ans}$$

(4.)

$$12\left\{\begin{array}{l}10\\15\end{array}\right. \begin{array}{r}3\\\underline{2}\\5\end{array}\qquad \left.\begin{array}{l}5:3::60:36\text{lb.}\\5:2::60:24\text{lb.}\end{array}\right\}\text{Ans.}$$

---

## PERMUTATION.

2. (**Art. 324, p. 305.**) $1\times2\times3\times4\times5\times6\times7\times8\times9 = 362880$ days $= 994$ years, 70 days, Ans.
3. $12\times11\times10\times9\times8\times7\times6\times5\times4\times3\times2\times1 = 479001600$; 1 to 479001600 Ans.
4. $7\times6\times5\times4\times3\times2\times1=5040$ words, Ans.

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## MENSURATION OF SURFACES.

1. (**Art. 328, p. 307.**) $18\div2=9$; $24\times9=216$ft. Ans.
2. $50+60+70=180$; $180\div2=90$; $90-50=40$; $90-60=30$; $90-70=20$; $90\times40\times30\times20=2160000$; $\sqrt{2160000}=1469.69+$ rods, Ans.

1 (ART. **331**, p. **308.**) 25 × 3 = 75 feet, Ans.
2. 37 × 27 = 999 feet; 40 × 20 = 800 feet; 999 — 800 = 199 feet, Ans.
3. 15 × 12 = 180 feet, Ans.

1. (ART. **333**, p. **309.**) 482 + 324 = 806ft.; 806 ÷ 2 = 403; 403 × 216 = 87048 square feet, Ans.
2. 28 + 20 = 48in.; 48 ÷ 2 = 24in. = 2ft.; 2 × 22 = 44 square feet, Ans.

1. (ART. **335**, p. **309.**) 65 × $\frac{14}{2}$ = 455; 65 × $\frac{18}{2}$ = 585; 455 + 585 = 1040 square feet, Ans.
2. 125 × $\frac{70}{2}$ = 4375; 125 × $\frac{85}{2}$ = 5312.5; 4375 + 5312.5 = 9687.5 square rods, Ans.

1. (ART. **338**, p. **310.**) 35 × 5 = 175; 175 × $\frac{24.08}{2}$ = 2107 square feet, Ans.
2. 20 × 6 = 120; 120 × $\frac{17.32}{2}$ = 1039.20 square feet, Ans.

1. (ART. **340**, p. **310.**) 3.141592 × 50 = 157.0796+ft. Ans.
2. 3.141592 × 100 = 314.15+ rods, Ans.

1. (ART. **341**, p. **310.**) .318309 × 80 = 25.46+ miles, Ans.
2. .318309 × 62.84 = 20+ feet, Ans.

1. (ART. **342**, p. **311.**) 200 × 200 × .785398 = 31415.92 sq. feet, Ans.
2. 400 × 400 × .079577 = 12732+p. = 79A. 2R. 12+p. Ans.

1. (ART. **343**, p. **311.**) 40 × .886227 = 35.44+ rods, Ans.
2. 100 × .282094 = 28.2+ rods, Ans.

1. (ART. **344**, p. **312.**) 30 × .707106 = 21.21+ inches, Ans.
2. 100 × .225079 = 22.5+ rods square, Ans.

1. (ART. **346**, p. **312.**) 14 × 10 × .785398 = 109.95+ square inches, Ans.
2. 8 × 5 × .785398 = 31.415+ft. = 31 square feet, 59+ sq. inches, Ans.

## [illegible]

1. [illegible] = 15; 3 + 3 + [illegible] × 1.5 × 1.5 × [illegible]; 5.895 × 2 = [illegible] square feet, Ans.

2. [illegible] × 2 = 162; [illegible]

1. [illegible] = 6; 6 − 5 = [illegible] × 6 = 36; [illegible]

2. [illegible]

3. [illegible]

1. [illegible] = [illegible] = 15.43+ square feet, Ans.

2. [illegible] = [illegible]+ sq. feet, Ans.

1. [illegible] = [illegible] 3.141592 × [illegible] = [illegible] feet, Ans.

2. [illegible] × [illegible] × [illegible] = [illegible] × [illegible] = [illegible]+ feet, Ans.

1. (Art. [illegible], p. [illegible].) [illegible] = [illegible]in. ; [illegible] = [illegible]in. ; [illegible] ÷ 2 = [illegible] ; [illegible] × [illegible] = [illegible] ; [illegible] ÷ [illegible] = [illegible]in. = [illegible] yards, Ans.

2. 50 ÷ 2 = 25 ; 25 × 12 = 300 square feet, Ans.

1. (Art. 257, p. 215.) 693 × 693 = 480249; 480249 × 500 = 240124500; 240124500 ÷ 3 = 80041500 cubic feet; 80041500 ÷ 8 = 10005187.5 feet; 10005187.5 ÷ 5280 = 1894.9 miles, Ans.

2. 5 × 5 × [illegible] = 19.6349; 19.6349 × 30 = 589.04; 589.04 ÷ 3 = 196.3+ feet, Ans.

1. (**Art. 360**, p. **316.**) $8 \times 4 = 32$; $4 \times 4 = 16$; $32 + 16 = 48$; $48 \times 20 = 960$; $960 \div 2 = 480$; $8 \times 8 = 64$; $4 \times 4 = 16$; $64 + 16 = 80$; $480 + 80 = 560$ square feet, Ans.
2. $18 + 9 = 27$; $27 \times 12 = 324$; $324 \div 2 = 162$; $18 \times 18 \times .079577 = 25.78+$; $9 \times 9 \times .079577 = 6.44+$; $25.78 + 6.44 = 32.22+$; $162 + 32.22+ = 194.22+$ square feet, Ans.

1. (**Art. 361**, p. **316.**) $20 \times 20 = 400$; $10 \times 10 = 100$; $400 \times 100 = 40000$; $\sqrt{40000} = 200$; $200 + 400 + 100 = 700$; $700 \times 30 = 21000$; $21000 \div 3 = 7000$ cubic feet, Ans.
2. $12 \times 12 \times .785398 = 113.097+$; $6 \times 6 \times .785398 = 28.274$; $113.097 \times 28.274 = 3197.704578$; $\sqrt{3197.704578} = 56.548+$; $56.548 + 113.097 + 28.274 = 197.919+$in. $= 1.3744+$ft.; $1.3744+ \times 20 = 27.488+$; $27.488+ \div 3 = 9.162+$ feet, Ans.

1. (**Art. 363**, p. **317.**) $3.141592 \times 20 = 62.83+$; $62.83+ \times 20 = 1256.6+$ square inches, Ans.
2. $3.141592 \times 8000 = 25132.736$; $25132.736 \times 8000 = 201061888$ square miles, Ans.

1. (**Art. 364**, p. **317.**) $20 \times 20 \times 20 \times .523598 = 4188.7+$ inches, Ans.
2. $5 \times 5 \times 5 \times .523598 = 65.44+$ cubic feet, Ans.

1. (**Art. 365**, p. **317.**) $10 \times 10 = 100$; $100 \div 3 = 33.33+$; $\sqrt{33.33+} = 5.773+$ inches, Ans.
2. $30 \times 30 = 900$; $900 \div 3 = 300$; $\sqrt{300} = 17.32+$ feet. Ans.

1. (**Art. 367**, p. **318.**) $20 \times 20 \times 30 \times .523598 = 6283.17+$ cubic feet, Ans.
2. $30 \times 30 \times 10 \times .523598 = 4712.38+$ cubic feet, Ans.

(11.)

$\dot{8}.14\dot{4}86\dot{5}72\dot{8}(2.012$

$8$

$20^2 \times 300 = 120000)\underline{144865}$

$120000 \times 1 = 120000$

$1^2 \times 30 \times 20 = \quad 600$

$1 \times 1 \times 1 = \quad \underline{1}$

$\underline{120601}$

$201^2 \times 300 = 12120300)\underline{24264728}$

$12120300 \times 2 = 24240600$

$2^2 \times 30 \times 201 = \quad 24120$

$2 \times 2 \times 2 = \quad \underline{8}$

$24264728$

(12.)

$.07\dot{5}68\dot{6}96\dot{7}(.423$

$\underline{64}$

$4^2 \times 300 = 4800)\underline{11686}$

$4800 \times 2 = 9600$

$2^2 \times 30 \times 4 = \quad 480$

$2 \times 2 \times 2 = \quad \underline{8}$

$\underline{10088}$

$42^2 \times 300 = 529200)\underline{1598967}$

$529200 \times 3 = 1587600$

$3^2 \times 30 \times 42 = \quad 11340$

$3 \times 3 \times 3 = \quad \underline{27}$

$1598967$

6. $\frac{5}{8}$T. $= \frac{5}{8} \times \frac{20}{1} = \frac{100}{8}$cwt.; $\frac{100}{8}$cwt. : $\frac{1}{1}$cwt. : : \$ 49 : $\frac{8}{100} \times \frac{1}{1} \times \frac{49}{1}$ = \$ 3.92 Ans.

7. $8 \times 4 \times 2 = 64$; $1728 \div 64 = 27$, number of bricks in a cubic foot; $40 \times 20 \times 2 = 1600$ cubic feet in the wall; $1600 \times 27 = 43200$ bricks, Ans.

8. $80 + 40 = 120$; $120 \times 2 = 240$ feet round the house; from this sum we deduct 4 feet for the corners; $240 - 4 = 236$; $236 \times 25 \times 27 = 159300$ bricks, Ans.

9. $18 \times 12 \times 144 = 31104$, number of square inches in the floor; $8 \times 8 = 64$ square inches in a tile; $31104 \div 64 = 486$ tiles, Ans.

10. 11cwt. 3qr. 19lb. = 1194lb.; 83cwt. 2qr. 11lb. = 8361lb.

$$\left.\begin{array}{r} \text{1194lb. : 8361lb.} \\ \text{46m. : 96m.} \end{array}\right\} \text{ :: \$ 18.25 : \$ 266.70+ Ans.}$$

11. $1.00 - .25 = .75$; \$ 24 : \$ 34 : : .75   $1.06\frac{1}{4}$; $1.06\frac{1}{4} - 1.00 = .06\frac{1}{4} = 6\frac{1}{4}$ per cent. Ans.

12. $120 - 20 = 100$ gallons remaining; \$ 30 + \$ 10 = \$ 40, price to be obtained; 100gals. : 1gal : \$ 40 : \$ 0.40 Ans.

13. \$ $128.25 \times 1.03$ = \$ 132.0975; \$ $132.0975 \times 1.06$ = \$ 140.02+ Ans.

14. $\frac{1}{3}$ of 24h. = 8h.; $\frac{1}{4}$ of 24h. = 6h.; $8 + 6 + 2 + 6 = 22$h. 24h. — 22h. = 2 hours, Ans.

15. $\frac{1}{4}$ of 24. = 6h.; $\frac{1}{5}$ of 24h. = $4\frac{4}{5}$h.; $\frac{1}{6}$ of 24h. = 4h.; $\frac{1}{7}$ of 24h. = $3\frac{3}{7}$h.; $6 + 4\frac{4}{5} + 4 + 3\frac{3}{7} + 2 = 20\frac{8}{35}$h.; 24h.— $20\frac{8}{35}$h. = $3\frac{27}{35}$ hours, Ans.

(16.)

$$\begin{array}{ccccccc} 5\frac{3}{5}\text{E.E.} & : & 71\frac{3}{4}\text{yd.} & :: & \$\,15.16 & & \\ 5 & & 4 & & & & \\ \hline 28 & : & 287 & :: & 15.16 & : & \$\,155.39 \text{ Ans.} \end{array}$$

17. $5\frac{3}{5}$ ft. : 4ft. : : 150ft. : $107\frac{1}{7}$ feet, Ans.

18. \$ 100 : \$ 150 : : 6m. : 9m. Ans.

19. \$ $1.20 \times 150$ = \$ 180.00, sum paid by the polls; \$ 6045.50 — \$ 180.00 = \$ 5865.50 to be paid on valuation.

[illegible]

[illegible] = length of one side [illegible] inches, Ans.

(26.)

| | | |
|---|---|---|
| Principal bearing interest from Oct. 29, 1856, . | | $ 1000.00 |
| Compound interest on $ 1000 from Oct. 29, 1856, to Oct. 29, 1862, 6 years, . . . . . | | 418.51 |
| Amount of principal to Oct. 29, 1862, . . . | | 1418.51 |
| First payment, Jan. 1, 1857, . . | $ 125.00 | |
| Compound interest from Jan. 1, 1857, to Oct. 29, 1862, 5y. 9m. 28d., . . . | 50.58 | |
| Second payment, June 5, 1857, . . . | 316.00 | |
| Compound interest from June 5, 1857, to Oct. 29, 1862, 5y. 4m. 24d., . . . | 117.02 | |
| Third payment, Sept. 25, 1857, . . . | 417.00 | |
| Compound interest from Sept. 25, 1857, to Oct. 29, 1862, 5y. 1m. 4d., . . . | 144.20 | |
| Fourth payment, April 1, 1858, . . . | 100.00 | |
| Compound interest from April 1, 1858, to Oct. 29, 1862, 4y. 6m. 28d., . . . | 30.62 | |
| Fifth payment, July 5, 1858, . . . | 50.00 | |
| Compound interest from July 5, 1858, to Oct. 29, 1862, 4y. 3m. 24d., . . . | 14.30 | |
| Amount of indorsements, . . . . . . | | $ 1364.72 |
| Balance due Oct. 29, 1862, . . . . . | | $ 53.79 |

27. $40 \times 40 = 1600$; $1600 \div 3 = 533.33\frac{1}{3}$; $\sqrt{533.33\frac{1}{3}} = 23.09401$; $533.33\frac{1}{3} \times 23.09401 = 12316.8+$ Ans.

28. $32 : 4 :: 18.5^3 : 791.453125$; $\sqrt[3]{791.453125} = 9.25 = 9\frac{1}{4}$ inches wide; $32 : 4 :: 8^3 : 64$; $\sqrt[3]{64} = 4$ inches deep, Ans.

29. As $\frac{1}{3}$ of the estate was given to the wife, $\frac{2}{3}$ of the estate will remain. The eldest son has $\frac{1}{4}$ of the $\frac{2}{3} = \frac{2}{12} = \frac{1}{6}$. The wife and son will therefore have $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$ of the estate. The daughter is to have $\frac{1}{6}$ of the residue; that is, $\frac{1}{6}$ of $\frac{1}{2} = \frac{1}{12}$. Therefore the wife, son, and daughter, will have $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{12} = \frac{7}{12}$; and $\frac{12}{12} - \frac{7}{12} = \frac{5}{12}$ will remain to be divided among the other heirs. But, if $\frac{1}{12}$, the daughter's portion,

[illegible]

[illegible] . . . . . . . . $1.50

[illegible]

passed from noon, and 7 the time to midnight, and 11 + 7 = 18 will represent 12 hours; therefore 7 : 18 : : 12h. . 4h. 40m. time from noon, Ans.

41. 20000 × 4 × 40 × 272¼ × 144 × 3 = 376358400000 cubic inches; 376358400000 ÷ 282 = 1334604255$\frac{45}{141}$ gallons; 1334604255$\frac{45}{141}$ ÷ 100 = 13346042hhd. 55gal., $\frac{45}{141}$gal. = 1qt. 0pt. 2$\frac{10}{47}$gi. Ans.

42. 1° : 71° 4′ : : 4m. : 4h. 44m. 16sec.; 11h. 16m. 0sec. − 4h. 44m. 16sec. = 6h. 31m. 44sec. Ans.

(43.)

18° 24′ E.
67° 21′ W.
1° : 85° 45′ : : 4m.
60 60
60 5145
4
60)20580
60)343m.
5h. 43m.

**Note.**—To perform this question, we are obliged to add 12 hours to the minuend, and it brings the time to the evening of the previous day.

h. m.
2 36 A. M.
5 43
8 53 P. M. Ans.

(44.)

h. m.
12 0
11 36
4m. : 24m. : : 1°
1
4)24(6°
24

16° 18′ W.
6 0
10 18 W.

45. 3000 × 5280 = 15840000; 15840000 ÷ 1142 = 13870+ seconds; 13870 ÷ 60 = 231m. 10sec.; 231 ÷ 60 = 3h. 51m.; 3h. 51m. 10+sec Ans.

46. 1142 × 10 = 11420; 11420 ÷ 5280 = 2m. 860ft. Ans.

47. 20 — 15 = 5 : 15 : : 10 : 30 cents, Ans.

48. 12½ — 10 = 2½; 10 : 2½ : : 1.00 : .25 per cent.; 19 — 15 = 4; 15 : 4 : : 1.00 : .26⅔ per cent.; .26⅔ — .25 = 1⅔ per cent., which Y makes more than Q.

49. From Sept. 25 to Jan. 1 are 97 days = 139680 minutes. From 23 minutes past 3 A. M. to midnight is 20h. 37m. = 1237 minutes. From Jan. 1, 1787, to Jan. 1, 1844, are 57 years = 365 × 57 × 24 × 60 = 29959200 minutes. From Jan. 1, 1844, to July 4, 1844, are 185 days = 185 × 24 × 60 = 266400 minutes. From Jan. 1, 1787, to Jan. 1, 1844, are 13 leap years; we have, therefore, to add the number of minutes in 13 days; 13 × 24 × 60 = 18720 minutes. To these we add the minutes from 30 minutes past 5 A. M. to midnight = 1050 minutes.

139680
1237
29959200
266400
18720
1050

Ans. 30386287 minutes

**Note.** — We have reckoned but 13 leap years from Jan. 1, 1787, to Jan. 1, 1844, because 1800 was *not* a leap year.

(50.)

|  | s. | ° | ′ | ″ |
|---|---|---|---|---|
|  | 3 | 14 | 26 | 14 |
|  | 8 | 19 | 43 | 28 |
| Ans. | 6 | 24 | 42 | 46 |

**Note.** — As the moon is east of the star, and is also moving eastward in her orbit, we must add 12 signs to the minuend.

(51.)

| A. | R. | p. | ft. |
|---|---|---|---|
| 3 | 1 | 23 | 200 |
| 1 | 2 | 37 |  |

We first reduce the 200 feet in the minuend to yards and feet; 200 ÷ 9 = 22yd. 2ft.

| A. | R. | p. | yd. | ft. | in |
|---|---|---|---|---|---|
| 3 | 1 | 23 | 22 | 2 | 0 |
| 1 | 2 | 37 | 30 | 8 | 0 |
| 1 | 2 | 25 | 21¼ | 3 | 0 |
|  |  |  | ¼ = | 2 | 36 |
| 1 | 2 | 25 | 21 | 5 | 36 |

(52.)

$\frac{5}{9} \div \frac{3}{4} = \frac{5}{9} \times \frac{4}{3} = \frac{20}{27}$ Ans.

(53.)

| | £. | s. | d. | qr. |
|---|---|---|---|---|
| | 1 | 19 | 11 | 3 |
| | 1 | 19 | 11 | 3 |
| | 1 | 19 | 11 | 3 |
| | 1 | 17 | 11 | $3\frac{1}{20}$ |
| | | 1 | 9 | $3\frac{229}{240}$ |
| | | | 1 | $1\frac{597}{660}$ |
| Ans. | 3 | 19 | 11 | $0\frac{1}{960}$ |

NOTE.—The first product is obtained by multiplying the multiplicand by 1, the second product by multiplying it by $\frac{19}{20}$, the third product by multiplying by $\frac{11}{240}$, and the fourth product by multiplying by $\frac{3}{960}$.

SECOND OPERATION.

1£. 19s. 11d. 3far. = 1919far.; 1919 × 1919 = 3682561far.; 3682561 ÷ 960 = 3836far. and $\frac{1}{960}$far.; 3836 ÷ 4 = 959d.; 959 ÷ 12 = 79s. and 11d.; 79 ÷ 20 = 3£. and 19s.

Ans. 3£. 19s. 11d. $\frac{1}{960}$far.

54. 1.00 — .40 = .60; .60 : 1.00 :: $ 68.75 : $ 114.58$\frac{1}{3}$ Ans.

55. $ 134.40 — $ 120 = $ 14.40; $ 120 : $ 14.40 :: 1.00 : .12, or 12 per cent. Ans.

56. $ 3600 + $ 4200 + $ 2200 = $ 10000; $ 15000 × .15 = $ 2250; $ 15000 — $ 2250 = $ 12750; $ 12750 — $ 10000 = $ 2750; $ 10000 : $ 36000 :: $ 2750 : $ 990, Emerson's gain; $ 10000 : $ 4200 :: $ 2750 : $ 1155, Bailey' gain; $ 10000 : $ 2200 :: $ 2750 : $ 605, Curtis' gain.

57. 3$\frac{1}{2}$in. × 2 = 7in.; 4ft. 9in. = 57in.; 3ft. 7in. = 43in.; 2ft. 11in. = 35in.; 43 × 2 = 86; 43 — 7 = 36; 35 — 7 = 28; 86 × 57 = 4902; 28 × 2 = 56; 56 × 57 = 3192; 36 × 28 × 2 = 2016; 4902 + 3192 + 2016 = 10110; 10110 ÷ 144 = 70$\frac{5}{24}$ square feet; 57 — 7 = 50; 43 — 7 = 36; 35 — 7 = 28; 50 × 36 × 28 = 50400; 50400 ÷ 1728 = 29$\frac{1}{6}$ cubic feet, Ans.

58. 64 × 2 = 128ft.; 32 × 2 = 64ft. From 64ft. we subtract four times the thickness of the wall; 1ft. 4in. × 4 = 5ft. 4in.; 64ft. — 5ft. 4in. = 58ft. 8in.; 128ft. + 58ft. 8in = 186ft. 8in. = length of the wall of the house.

```
      ft.   in.        ft. in.      ft. in.          ft.     in.
      186   8          7 4          2   8            3       8
            4            3          5   8           .6       4
      746   8         22 0         13   4           18      32
            7          3 8          1   9 4         14       2
   3)5226   8         66 0         15   1 4         72      64 cubic
    1742   2 8        14 8                4         18         inches
    6968  10 8        80 8         60   5 4        252         [in a brick
     765  11 1 4                          4
    6202  11 6 8                  241   9 4
      12                           80   8
   74435                          252
      12                       3)574   5 4
  893226                          191   5 9 4
     ,12                          765  11 1 4
64)10718720(167,480 bricks, Ans.
```

59. $\frac{1}{3}$ and $\frac{1}{4} = \frac{4}{12}$ and $\frac{3}{12}$; $\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$; $\frac{7}{12} : \frac{4}{12} :: \$\,1000 : \$\,571.42\frac{6}{7}$, Benjamin's share; $\frac{7}{12} : \frac{3}{12} :: \$\,1000$ · $\$\,428.57\frac{1}{7}$, Samuel's share.

60. As Bailey occupied the whole house the first four months, he must pay $\frac{1}{3}$ of \$ 100 = \$ 33$\frac{1}{3}$. As he occupied half of the next four months, he must pay half of \$ 33$\frac{1}{3}$ = \$ 16$\frac{2}{3}$, and Bricket must pay the same sum, \$ 16$\frac{2}{3}$. For the last four months each must pay $\frac{1}{3}$ of \$ 33$\frac{1}{3}$ = \$ 11$\frac{1}{9}$. \$ 33$\frac{1}{3}$ + \$ 16$\frac{2}{3}$ + \$ 11$\frac{1}{9}$ = \$ 61$\frac{1}{9}$, Bailey's share of rent; \$ 16$\frac{2}{3}$ + \$ 11$\frac{1}{9}$ = \$ 27$\frac{7}{9}$, Bricket's share; \$ 11$\frac{1}{9}$ = Dana's share.

61. $42\frac{1}{4} \times 144 \times 2 = 12168$ square inches of surface. $3 \times 3 \times 2 = 18$ inches, the superficial contents of a side of two cubes, which measure 3 inches on each side. $12168 - 18 = 12150$; $12150 \div 6 = 2025$; $\sqrt{2025} = 45$; $45 + 3 = 48$ inches, Ans.

In order to understand the rationale of the above operation, the pupil will take six square pieces of board, which are of the same size. With them let him construct a cubical box; and then, by examining it, he will find that he needs two small cubes, whose sides are equal to the thickness of the board or plank of which his box is constructed, in order to complete it. As our plank in the above question is three inches thick, the sides of each cube will be three inches, and the surface of one side will be $3 \times 3 = 9$ square inches, and of the two cubes it will be $2 \times 9 = 18$ square inches. These 18 inches, therefore, must be subtracted from the surface of the plank, thus: $12168 - 18 = 12150$. These remaining inches are the surface of the six square boards, and $\frac{1}{6}$ of these will be the surface of one board, thus: $12150 \div 6 = 2025$. The square root, therefore, of this number, will be one side of one of the boards. $\sqrt{2025} = 45$ inches. To this we must add the thickness of the plank or board, $45 + 3 = 48$ inches, Ans.

62. 1.00 — .10 = .90; 1.00 + .16 = 1.16; 1.16 — .90 = .26; .26 : 1.00 : : $ 21.84 : $ 84.00, real value of the horse; 1.00 : .90 : : $ 84.00 : $ 75.60, price paid, Ans.

63. 1.00 — .12 = .88; .88 : .100 : : $ 4.40 : $ 5.00; 1.00 : 1.10 : : $ 5.00 : $ 5.50, Ans.

(64.)

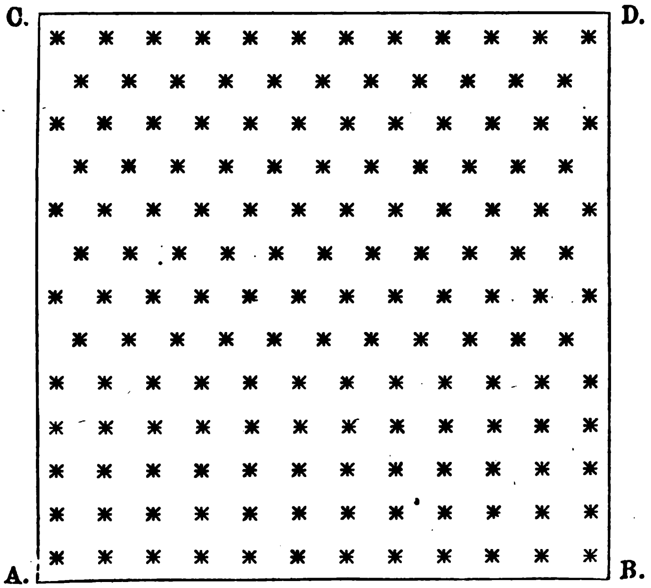
| | | | | | |
|---|---|---|---|---|---|
| Emily, | Jane, | | Abigail, | Nancy, | $ 19,000 |
| Emily, | Jane, | Betsey, | Abigail, | | 19,200 |
| | Jane, | Betsey, | Abigail, | Nancy, | 20,000 |
| Emily, | | Betsey, | Abigail, | Nancy, | 20,500 |
| Emily, | Jane, | Betsey, | | Nancy, | 21,300 |
| | | | | 4) | $ 100,000 |
| | | | | Sum of the fortunes, | $ 25,000 |

$ 25,000 — $ 19,000 = $ 6,000, Betsey's fortune.
$ 25,000 — $ 19,200 = $ 5,800, Nancy's fortune.
$ 25,000 — $ 20,000 = $ 5,000, Emily's fortune.
$ 25,000 — $ 20,500 = $ 4,500, Jane's fortune.
$ 25,000 — $ 21,300 = $ 3,700, Abigail's fortune.

(65.)

Our garden is 12 rods square; but, as no tree is to be set within half a rod of the fence, the trees occupy only a space 11 rods square. As our object is to plant the greatest possible number of trees, we first plant the row A B, which will contain 12 trees.

and above this row we plant 4 other rows, each tree being one rod from any other tree, and the rows one rod apart. We have now a space left which is 11 rods long and 7 rods wide. If we were to plant the remaining trees in the same manner as the others, we would have but 7 more rows, and our garden would have only $12 \times 12 = 144$ trees. But, if we set out the remainder of the trees in the quincunx order, we shall have 8 more rows, 4 of which containing 12 trees each, and 4 containing 11 trees each. Although the trees are a rod from each other, the rows are only $1^2 - .5^2 = 1 - .25 = .75$; $\sqrt{.75} = .866+$ rods apart. We have thus set out 9 rows, each containing 12 trees $= 12 \times 9 = 108$ trees; and 4 rows, each containing 11 trees $= 44$ trees. Thus we have $108 + 44 = 152$ trees, Ans.



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